

# 2012 Hydro Report

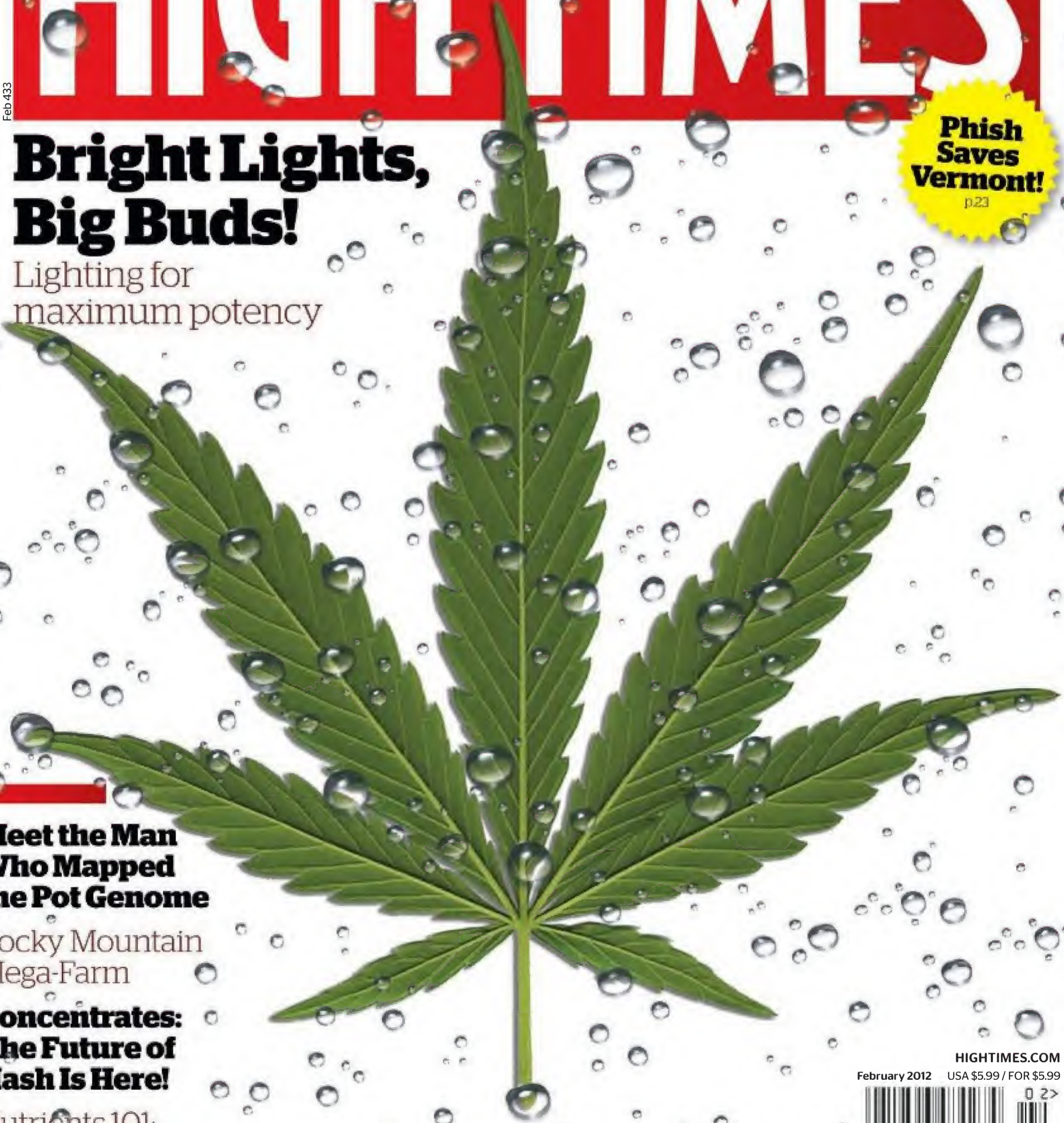
# HIGHTIMES

Feb 433

## Bright Lights, Big Buds!

Lighting for  
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**Phish  
Saves  
Vermont!**  
p.23



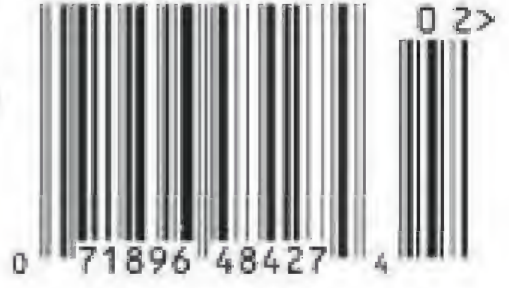
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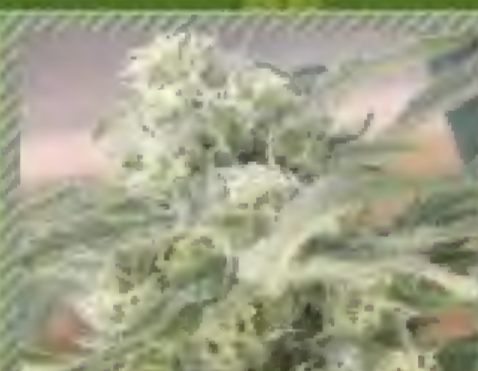
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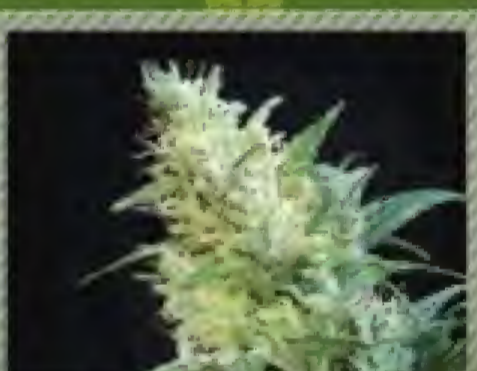
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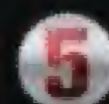
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—2012 Hydro Grow Report, Page 47

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## **58 The Concentrate Revolution**

Butane honey oil (BHO) brings hash into the 21st century, and carries with it a whole new array of slang and devices. *By Bobby Black*

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A Colorado family, with four generations of legal pot users, brings in their fall harvest. *By Dan Skye*

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Our good friend and longtime contributor

Mary Ought Six brings her grow expertise to the Cultivation Dept., detailing for beginners the benefits, pitfalls and nuances associated with pumping up gardens with today's market nutrients.

## **82 UV Light & Pot Potency**

In this examination of ultraviolet (UV) light and its effects on THC production, author Greg Green goes in-depth to figure out whether the hype behind supplemental UV lighting is legit or overrated.

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By mapping the cannabis genome, Medicinal Genomics founder Kevin McKernan hopes to unlock the mysteries of marijuana's DNA. *By Chris Simunek*





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**“Water is the driving force of all nature.”**

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**W**ELCOME TO OUR 13th Annual Hydro Special. It's a virtual reservoir filled with valuable information on growing marijuana plants in nutrient solutions, completely without soil, resulting in speedy growth and huge hydroponic harvests.

As I approach my 10th year as a HIGH TIMES journalist, you might wonder how much more I could possibly write about indoor hydroponic farming? Actually, plenty! In fact, the hydroponics industry and the variety of techniques for soilless growing devel-



oped by underground scientists continue to advance in amazing ways.

New innovations in hydroponics include deep-water culture, aeroponic and bubbleponic systems that deliver a tremendous amount of food and air directly to plant roots and result in robust, even astonishing growth. You'll find traditional ebb-and-flow, flood-and-drain, and drip-emitter systems discussed here, too. We want to

enlighten beginners, as well as intermediate and expert growers, on the benefits of liquid-based cannabis cultivation to bulk up yields.

Also in this bud-packed issue: an eye-opening story on pot and pregnancy; a timely report on the explosion in popularity of marijuana concentrates; a profile of one family grower on the Colorado medical marijuana scene; and two in-depth cultivation features focusing on lighting and nutrients. Plus we have an interview with Kevin McKernan, the scientist who recently mapped the marijuana genome.

As the driving force of nature, water can do a tremendous amount of damage as well. Check out page 23 and read our new managing editor Jen Bernstein's story on how Phish raised over \$1 million dollars for Vermont in the wake of Hurricane Irene's devastation.

And, as always, there's the usual gallery of top pot shots from the gardens of growers across the globe. We pride ourselves on running the best pot photography on earth, but we couldn't do it without you. Get growing now and join our powerful community!

*Danny Danko*

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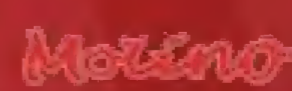
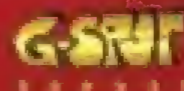
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### New-School Shroom Tips

Here's an update on "Boomer School" (Oct. '11 HT): Spore syringes can now be injected directly through a sealable port in a MycoBag (premixed substrate), which doesn't use rye berries as a primary component. Google "MycoBag" or go to mycofactory.com. Your mycelium grows right in the bag. It's infallible, with little or no risk of contamination—simplicity itself. PF cakes equal very limited grow space. We now use compost! (Pre-sterilized.) Try High Mountain Compost in the 10-pound bags. Buy a plastic bin, dump in the compost, dump in the Myco-Bag and mix it up a bit. You'll get major yields.—*Lou in Cleveland*

### Stoner Immigrant

This old fart is the Comeback Kid—I'm a Limey standing up for the rights of Yanks under the California constitution. Next month, I will be 63 years of age. I have lived in this country since 1980. I came here for a better life, and Americans have at least got a Constitution and a Bill of Rights. I don't regret one minute coming to this country. I've had fun, and now I have grandkids. Still, I still don't like Big Brother telling me what to do when I have a legal right to do it.—*Richard D.*

### Sniff This!

I think you guys should figure out a way to turn the centerfold into a scratch-and-sniff. —*Nick*

We've considered that for years. However, using real cannabis extract to create the proper fragrance is illegal in many states, so sending magazines through the mail might be a bit dicey. And we haven't been able to find any synthetic substitute that successfully simulates the smell of great buds.

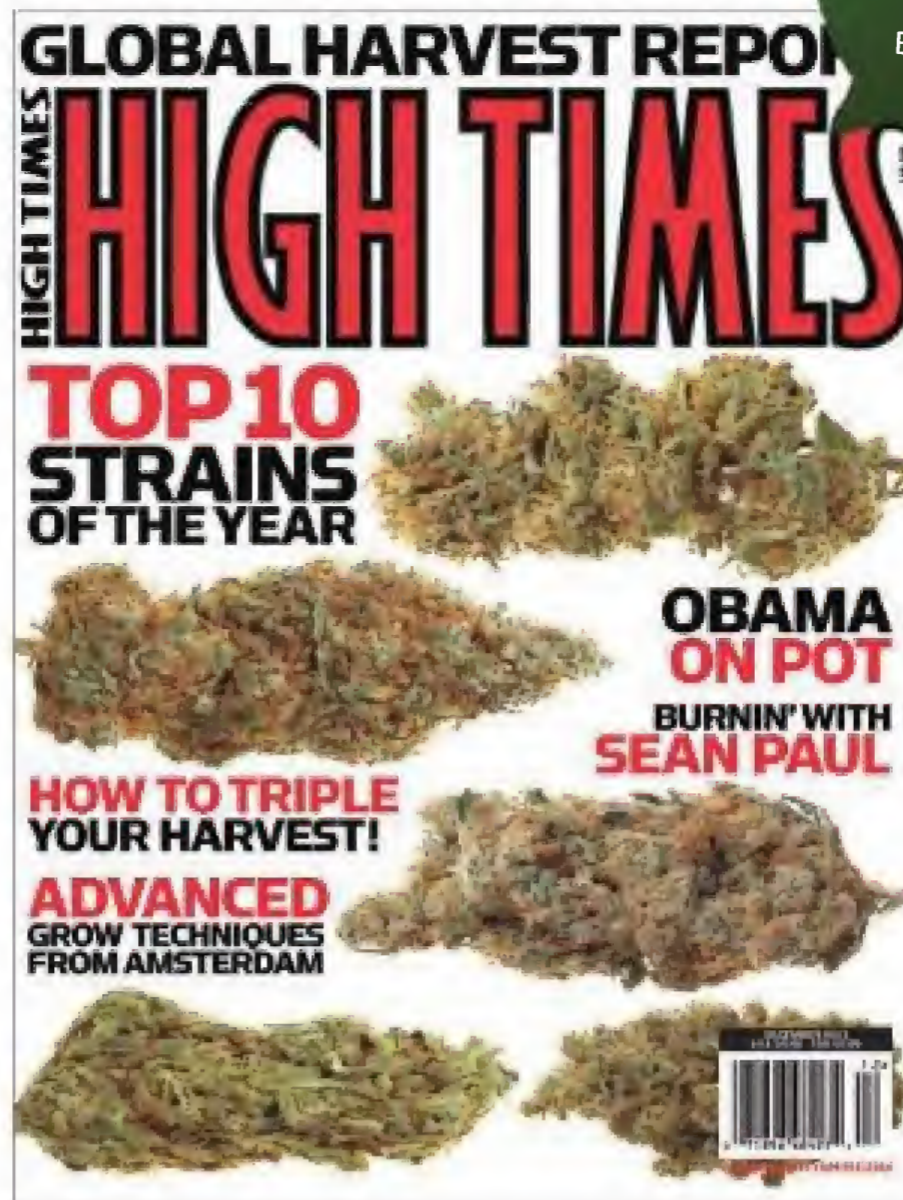
### She's A Winner

Hello! I just realized my drawing won in the HIGH TIMES Pot 40 (Nov. '11). My drawing is number 20, and I am so honored to be in your magazine. But I have a question: If someone's drawing is picked, how would they know that it will be in the magazine? I would have appreciated such good news!—*Natasha*

Unfortunately, we're not able to contact everyone who has a submission printed. Also, nearly all of the Pot 40 submissions are submitted anonymously.

### Pot and Guns

People are losing their Second Amendment rights for being medical marijuana patients. If the government thinks they can take my guns because I smoke pot,



**“There’s only two ways to stop the senseless killings. Our government must legalize and regulate pot or we, the people, boycott marijuana from south of the border.”**

they've got another think coming. How can NORML or the NRA sit by and do nothing about this horrible thing that breaks the Constitution? This scares me into thinking that we really are in a police state. Can the government do whatever they want now? When are we really going to see the “change” we were promised? When will the people finally revolt?—*GreenD*

### Tomat-No!

The hydroponic book by J.P. Jarvis, *Hi-Yield Homemade Hydroponics*, will not easily grow “tomatoes,” in my opinion. The light at the root system and on the jiffy cube will prune the roots. It will also encourage algae to grow in the water in a short period of time.—*Jiggs*

### Drug Test Travesty

I was just offered a job at a local furniture company in Holland, MI and everything was going well until I took the drug screen and failed it. I don't smoke, do drugs or even drink. I asked the company if I could retake the test and they denied me. I think that the company is using drugs as a scapegoat to not hire people in their 40s or older. There have been other reported stories

in the area that the company has done the same to others. What legal rights do I have to resolve this problem, and to make sure that it doesn't happen to anyone else?—*Unemployed*

If you were offered the job before the drug test, then it wasn't discrimination. The drug test was obviously flawed. If you do feel you were a victim of age discrimination, find a lawyer or contact the ACLU.

### Boycott Cartel Pot!

I am concerned with what's going on across the border. I live in south Texas and it's only a matter of time until the drug warfare spills over to our side. I'm asking that all pot smokers boycott Mexican-grown and -transported marijuana that fuels the sad shit that's happening to the innocent (and not so innocent) across the border. I know some people can't afford domestic pot. So I'm asking the price come down so it could be affordable for the rich as well

as us poor people. There's only two ways to stop the senseless killings. Our government must legalize and regulate pot or we, the people, boycott marijuana from south of the border. Thanks again and please help this boycott move forward.—*Longtime reader and follower*

### Pick My Crop


How does one get pictures of their crop in HIGH TIMES? I sent in a pic and also a question about growing, but I have yet to hear a word and it's been a while now. I live in the northeasternmost part of the US and would like to share some of my bountiful fruits. I really enjoy your website—the articles are most helpful and the pix are wonderful. I love the mag also!—*Merritts*

We can't guarantee that every submission we get will be printed. But we're always looking for the highest-quality photos from our readers, so keep shootin'.

### Motown Mojo

I wanted to thank HIGH TIMES for choosing Detroit to have your Medical Cannabis Cup this past October. Lord knows, my dear city needs all the help it can get. Long live medical marijuana in Michigan!—*C.J.*





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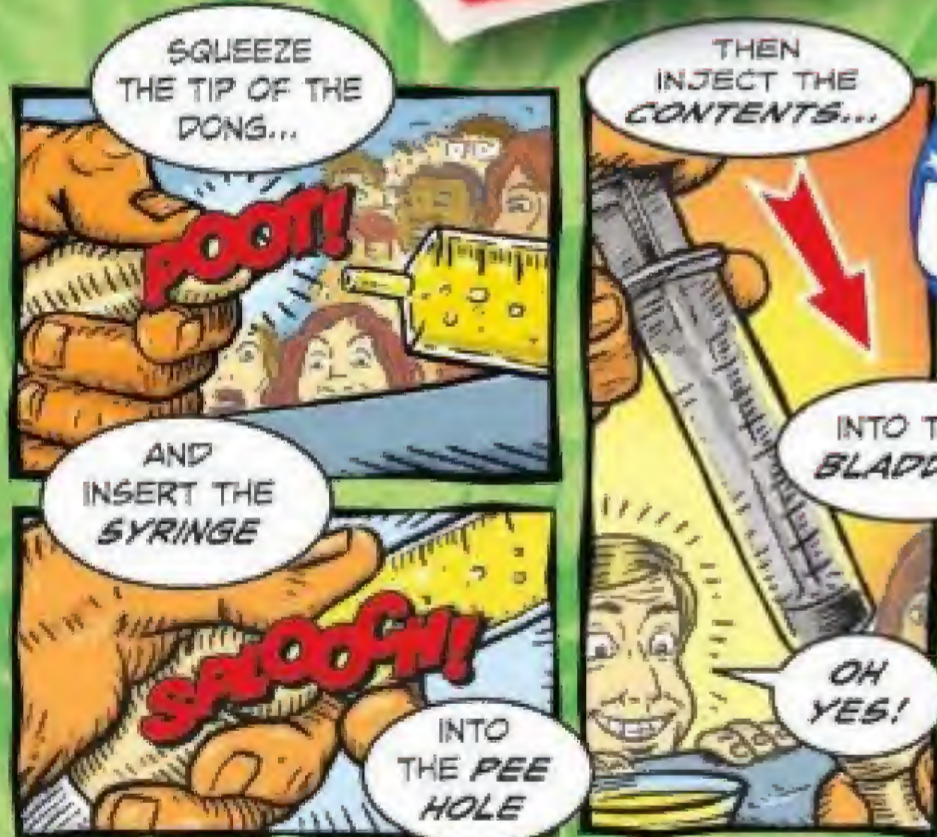
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**FLYING HIGH** Pro skater David Gravette is well known as the top joint roller on the infamous Creature Skateboards team, and his first pro model shoe from Vox even features a large embroidery that reads “Spliff Life.” But puffing on some dank herb and pulling off a huge frontside air in a sketchy do-it-yourself skate spot—all while being distracted by some massive, ready-to-harvest pot plants—proved more challenging than expected. “What made it so difficult was the struggle for speed, the rough ground, and the freezing wind blowing in my face,” Gravette told *High Times* after returning to earth. “But then again, having such a perfectly rolled spliff helps.”

**Contact  
High**











February 2012 **High Times**

**LOVE AT FIRST SIGHT** Mary Anne Montoya of Pueblo, CO, uses medical marijuana to ease her glaucoma—but up until last fall, the 98-year-old great-great-grandmother had never seen a plant. Fortunately, her grandson Michael Stetler oversees this outdoor medical garden, where she encountered a ripe bud with unrepressed joy. Mrs. Motoya represents one of four generations in her family who legally use medical marijuana. Read the whole story in “Family Values” on page 62.

17

**Contact  
High**



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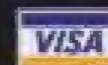
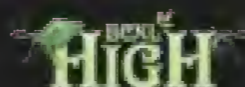


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# Highwitness News

Phish return home to Vermont with a benefit for flood victims.



**Medical**  
**Pot & Pregnancy**  
Pot is relatively innocuous for some symptoms. p.33

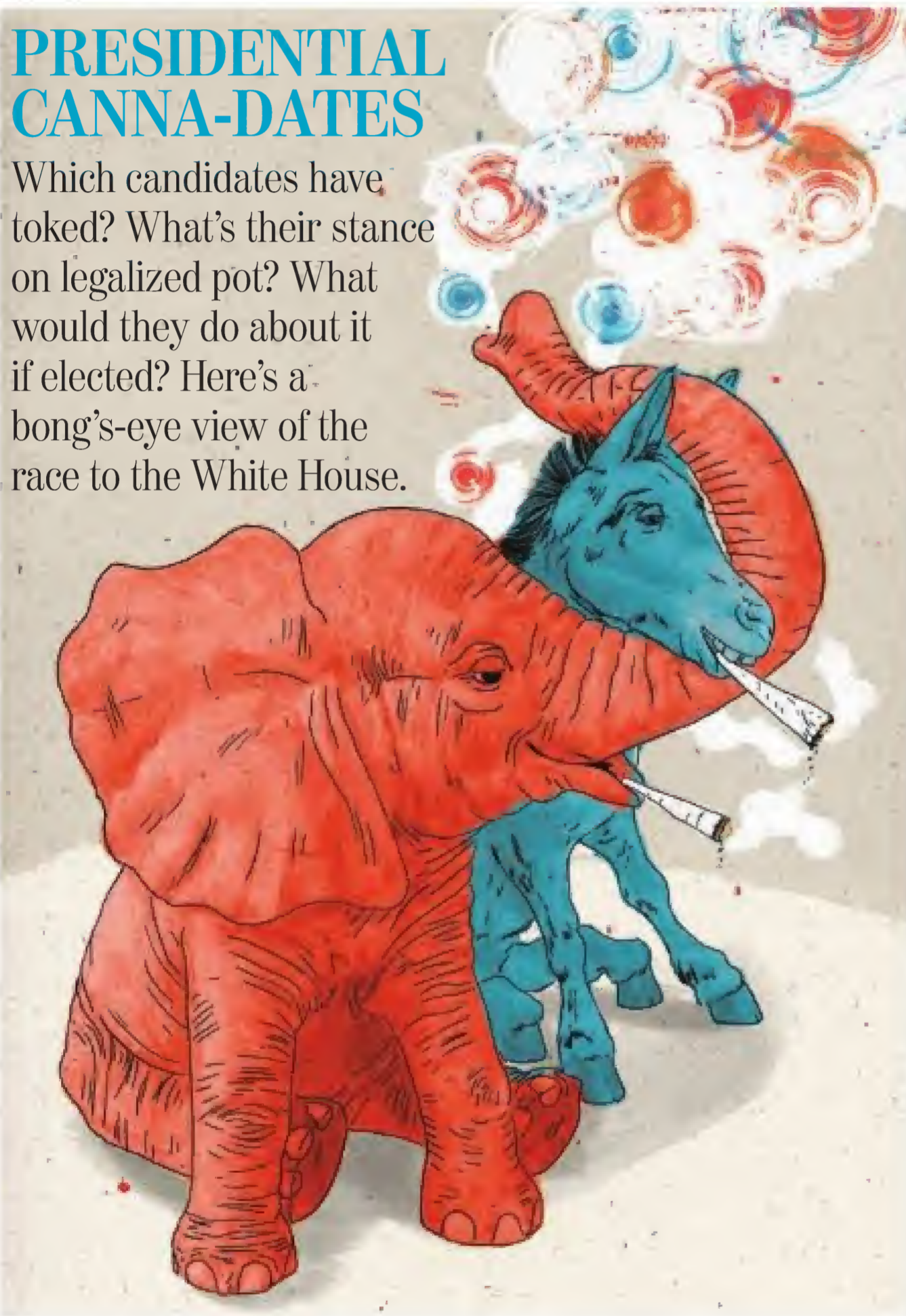


**Gear**  
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What's new for cultivators and connoisseurs p.40



## PRESIDENTIAL CANNA-DATES

Which candidates have toked? What's their stance on legalized pot? What would they do about it if elected? Here's a bong's-eye view of the race to the White House.



marijuana for any purpose, but the Texas governor has voiced respect for the rights of states that have legalized medical pot. In November, he told NPR: "It ought not be the federal government's job telling them they can't do it. I totally and completely disagree with the concept of legalizing marijuana, but it ought to be California's decision." **PAST USE:** No record or admission by Perry that he ever smoked pot. He did come of age in the late '60s and early '70s, so there's a chance he may have tried it in his callow youth. If so, he'll eventually have to 'fess up.

be the product of the prescribed medication she takes for her often-debilitating migraines.



**REP. RON PAUL (R)**  
**POT POSITION:** At 76, the Texas congressman is the oldest candidate, but he's as progressive as any when it comes to marijuana. Paul personally opposes drug use, but backs states' rights to legalize pot both medically and recreationally. He compares pot criminalization to Prohibition and is a staunch advocate of legal hemp. **PAST USE:** Paul says that he's never smoked pot, nor has he ever been in the presence of anyone else who was smoking it—at least to his knowledge. His son Rand, now the junior senator for Kentucky, is another story.



**REP. MICHELE BACHMANN (R)**  
**POT POSITION:** The darling of the Tea Party, Bachmann has been tight-lipped about medical marijuana and pot in general. Given her opposition to just about anything fun in this world, she's unlikely to support legalization. In August, the Minnesota congresswoman ignored a pot activist's on-camera query about medical marijuana. **PAST USE:** Not much there, but all signs suggest she's never smoked. However, some of her wacky ideas may



**MITT ROMNEY (R)**  
**POT POSITION:** The former governor of Massachusetts can't be accused of being wishy-washy on pot: He's consistently been against it. During his 2008 presidential bid, Romney declared: "I don't want marijuana to be used in our country. I'm not going to legalize



**PRESIDENT BARACK OBAMA (D)**  
**POT POSITION:** The Obama administration has turned sharply against medical pot, using federal agents to raid dispensaries in Montana,

California, Colorado and Michigan over the past two years. Last spring, US Attorneys also threatened officials in medical-marijuana states with prosecution for assisting in such programs. **PAST USE:** On the campaign trail, Obama was refreshingly and admirably candid about his personal

marijuana (and cocaine) use. But if you thought he was one of us, think again.



**GOV. RICK PERRY (R)**  
**POT POSITION:** Perry opposes legalizing



« marijuana.” He supports DEA raids on dispensaries and is an outspoken opponent of using medical marijuana to treat illness. He only approves of legal synthetics like the unreliable Marinol. **PAST USE:** Romney is a Mormon, and adherents of that religion are forbidden from indulging even in caffeine, so we’ll assume he’s never tried pot.



### GARY JOHNSON (R)

**POT POSITION:** No confusion here: The former New Mexico governor sat for a HIGH TIMES interview in August, in which he outlined the benefits of legalizing pot and explored strategies on how to achieve it.

**PAST USE:** Johnson freely admits to smoking pot recreationally in the 1970s. He’s also the one candidate who’s apparently smoked pot within the past 25 years: He used it medicinally to cope with excruciating pain from the multiple fractures he suffered in a paragliding accident in 2005.



### HERMAN CAIN (R)

**POT POSITION:** The ex-CEO of Godfather’s Pizza allegedly supports states’ rights when it comes to medical marijuana. However, in August, he ignored a pot activist’s on-camera questions regarding whether he supported medical pot. His website has no pertinent info on the subject. As we go to press he’s fighting sexual

harassment allegations. **PAST USE:** As ex-chairman of the Kansas City Federal Reserve, it’s possible Cain never partook while climbing the ladder of success for fear it would knock him down a rung or two. Still, he was head of a pizza chain, so he’s gotta know something about the munchies.



### RICK SANTORUM (R)

**POT POSITION:** The polarizing ex-senator from Pennsylvania stated in August that if elected president—fat chance, Rick!—he’d enforce the federal prohibition against all marijuana use, medical or otherwise, calling it “an activity that is not consistent with American values.”

**PAST USE:** Santorum admitted to smoking pot while in college. Apparently, American values changed once he started seeking public office.



### JON HUNTSMAN (R)

**POT POSITION:** Last January, Nick Murray of the University of New Hampshire NORML asked Huntsman whether he would prosecute medical-marijuana growers and distributors. The former Utah governor and ambassador to China replied simply, “I would let states decide that.”

**PAST USE:** As a Mormon, Huntsman has never puffed, but in the ’70s he did play keyboards in a progressive rock band called Wizard. As the story goes, his four bandmates got high in their cars at various times

during their daily five-hour rehearsal sessions, at which point Huntsman would stay inside and practice alone.



### FRED KARGER (R)

**POT POSITION:** His political experience derives from his work as a consultant on nine presidential campaigns. He’s that rarest of Republicans: Jewish, gay, and openly supportive of marijuana legalization and taxation. **PAST USE:** No public record or admission of use, but given his open mind to just about anything—he’s even worked on behalf of Big Tobacco!—we’ll speculate that Karger has at least tried pot.



### NEWT GINGRICH (R)

**POT POSITION:** The former Georgia representative and House Speaker has about as much chance of becoming president as a joint does surviving a drum circle. He publicly endorsed medical marijuana in 1982 (a pioneer!), but now he opposes it. And let’s not forget that while in Congress, Newt proposed legislation imposing the death penalty on anyone crossing the border with as little as two ounces of pot. Earlier this year Gingrich’s campaign management team resigned amid complaints of his meddling wife. **PAST USE:** Newt admits to smoking pot at a party in college. Perhaps he blames peer pressure for his youthful indiscretion. These days, his only influences are corporate. *Mark Miller*

## BRIEFS



### Ganja Gun Control

➤ In September, the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) issued a directive prohibiting gun dealers from selling firearms to anyone using marijuana—including legal medical-marijuana patients. The move has provoked outrage among cannabis activists, gun advocates, civil libertarians and even some government officials.

Now, when purchasing a gun, a potential buyer must declare on an ATF form whether he or she is a pot user. If the answer is “yes,” the purchase is automatically denied. If the answer is “no,” a buyer can still be refused sale if the seller has “reasonable cause to believe” that the prospective purchaser is either using or addicted to an unlawful drug. Aside from the fact that medical pot patients are neither “addicted” nor “unlawful” how the hell does a gun dealer become qualified to make such a diagnosis?

The ATF memo came about after gun dealers requested direction on dealing with customers who use medical marijuana cards as ID to acquire firearms. Montana Attorney

General Steve Bullock responded with a letter to US Attorney General Eric Holder questioning whether the ATF directive violates both the Second Amendment (right to bear arms) and the Fifth Amendment (right against self-incrimination).

Bullock criticized the ATF for drafting its anti-pot memo without input from state officials and pointed out the obvious hypocrisy, since federal law does permit prescription drug users to buy firearms and ammo. (Incidentally, a 2011 study issued by the Institute of Safe Medication Practices found a tangible link between mass-murdering psychos and their use of prescription meds.)

Larry Pratt, executive director of Gun Owners of America, also condemned the memo. “Dealers have no way of knowing whether someone smokes pot unless they come in toking,” he observed in The Washington Times, adding that the ATF is “totally out of control.” And The Denver Post published a fiery editorial agreeing with Attorney General Bullock in Montana that the ATF’s anti-pot directive is an “assault on constitutional rights.”



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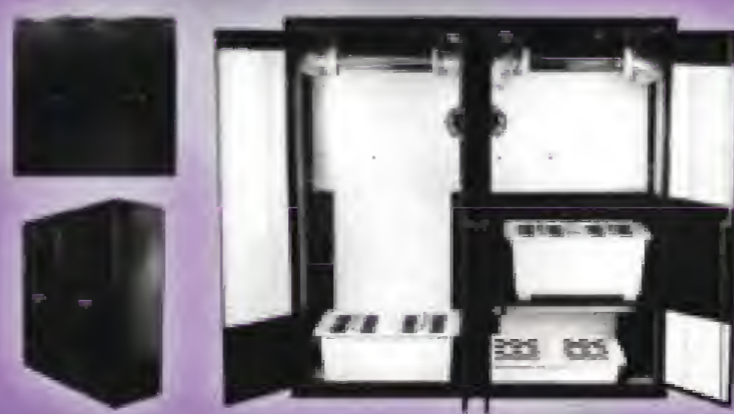
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## PHISH PHILANTHROPY

Seven years after their last show in Vermont, the band returns for a purpose.

*By Jen Bernstein. Photos by Dave Vann*



Phish at the Champlain Valley Expo in Essex Junction, VT.





The show kicked off with “Chalk Dust Torture.”

Dust Torture” —from the album *Picture of Nectar* (Nectar’s being the local Burlington bar that helped the band get their start)—there would be not one, but two introductions. The first was a rare occasion for Mike Gordon, who addressed the crowd by saying that he would forgo trying out his “fourteen new jokes,” and instead genuinely expressed how “pumped” the band was. He ended by bringing out Vermont’s Governor Peter Shumlin, who individually name checked “Mike, Page, Trey and Jon” for helping their fellow Vermonters.

As the band took the stage against a beautiful sunset, with a hero’s welcome home, a few questions about the show’s song choices were answered: There would be no special water-themed set (as speculated) with a Phish original like “Water in the Sky,” Dylan’s “Hurricane,” The Who’s “Drowned” or Led Zep’s “When the Levee Breaks.” Instead, the tightly played show focused on Phish’s ability to rock out with “Down With Disease” and “Character Zero”; stretch and jam with “Carini” and “Slave to the Traffic Light”; and play a favorite tune or two like “Suzy Greenberg” or “Wolfman’s Brother” for the casual fan or hardcore Phish head. Indeed, a huge highlight was the first set closer as they jazzed up the usually swing-driven “Julius.” It’s a must-hear from the show, highlighting Phish’s success in executing focused jams.

In the end, Phish raised \$1.2 million for the Green Mountain state. Governor Shumlin said it best: “If you’ve been to Vermont, you know it’s a special place. We are a small state that values community, and have a thriving arts and music scene. Vermonters are proud of Phish and the national attention they have gained over the years, but we also see them as we see all other fellow Vermonters—as friends, neighbors, and members of our community.” ✨

In early September, Phish was wrapping up their tour in Denver, Colorado, as news broke that hundred-year-old bridges, entire towns, and highways in the Northeast were washing away in the aftermath of Hurricane Irene. Particularly hard-hit was the state of Vermont, where Phish formed back in 1983 while attending the University of Vermont.

Vermont wasn’t far from their minds as Phish opened their three-night Labor Day run on September 3rd, with an entire show of “S”-titled songs. Crafting the set list that night, the band was already deep in talks with Vermont’s Governor Peter Shumlin, friends at home, and their own production crew about the possibility of holding a benefit. Phish decided on the Essex Fairgrounds in Champlain Valley, and if you go back and listen carefully to that ssssspecial show you can hear some hints forming...that a show in Essssex was about to take place.

The last time the band played their home state was in 2004, at a pre-break up farewell show in Coventry. It turned out to be a sloppy mud fest with the grounds saturated from summer rains and tens of thousands of fans were turned away, including this writer, who walked 14-plus miles in.

Now, ironically, many Phish fans found themselves back in Vermont because of rain. Even bassist Mike Gordon commented on the peculiar happenstance: “First of all, there’s a strange karmic connection, because our last Vermont concert was Coventry, with more flooding than they had in 50 years, and 20,000 cars or however many couldn’t park, and then to come back and try to do something about water damage—it’s

just very appropriate.”

Tickets for the Recovery Benefit quickly sold out, and Phish fans flew in from every corner of the country to help support those devastated by the hurricane—and, of course, to catch what promised to be a really memorable show. Having Phish and their fans come to your town is no small event, and in true communal fashion, everyone pulls together. The day-of-show vibe had an electric current running through it—fans who gathered on the grounds and in beer tents before the show were beyond excited to be in town, and get together for one last summer show.



**“They care so much about Vermont, and Vermonters. It’s so important for our town.”**

For one Vermont fan from Dover, it was particularly meaningful that Phish held a benefit concert. Jennifer Langdon, general manager for lodging at the ski resort Mount Snow, wore a sign to the show that read “Wilmington Vermont Thanks You.” Many downtown businesses and homes in Wilmington suffered extensive water damage and one Mount Snow lodge became an evacuation center for displaced families. Langdon said how she was proud of Phish and their message. “They care so much about Vermont and Vermonters. It’s so important for our town. They got out the message that we were really in dire need.”

Before the evening’s two-set show kicked off with the tune “Chalk

**Governor Peter Shumlin signed a marijuana dispensaries bill that Vermont legislature passed this year.**



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PHOTOS BY DAVE VANN © PHISH 2011



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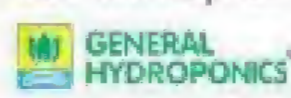
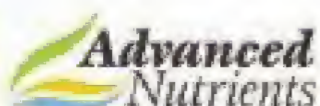



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## The Ragbirds

The Ragbirds are a fusion of folk rock and pop hooks over danceable world rhythms, stirred with a Celtic fiddler's bow. Led by dynamic frontwoman and multi-instrumentalist Erin Zindle, the band utilizes an arsenal of instruments from around the globe.

Surrounding Zindle's earthy-sweet voice is the dynamic whirlwind of guitarist T.J. Zindle and bassist Brian Crist, spinning relentlessly over the world-beat grooves of drummer Loren Kranz and percussionist Randall Moore. Erin Zindle skillfully switches between violin, mandolin, banjo, and accordion and, evoking the awe of audiences across the country.

The Ragbirds were formed in 2005, the same year they released *Yes Nearby*. After recording two more highly regarded albums in 2007 and 2009, the Ragbirds reached a milestone



in their young careers when, in 2010, they independently marketed and sold their 10,000th album. Catch them on tour in their diesel bus, which runs completely on recycled vegetable oil. For more on the Ragbirds, including audio samples and tour dates, check out [hightimes.com/theragbirds](http://hightimes.com/theragbirds)



Cerebral Ballzy, emptying stash-boxes across America.

## HARDCORE STONERS

### Cerebral Ballzy blaze a trail of smoke and thrash.

Ever since their debut seven-inch, the grip-tape-covered "You're Idle", came out in 2010, Brooklyn skate punks Cerebral Ballzy have been a polarizing band. Self-styled bastions of cool like [StreetCarnage.com](http://StreetCarnage.com) and [Vice](http://Vice) tweet their praises, while the kids on [PunkNews.org](http://PunkNews.org) deride them as "fake." Now, with last summer's release of their first, eponymous full-length on Adult Swim/Williams Street Records, CB will be taking their off-the-chain live show from the parking lots of Ridgewood, Queens, to the festival stages of the UK and Japan, where old mohawked dudes and young heshers alike will circle-pit to their raucous, '80s-style hardcore.

Say what you will about their sound, their style and their success, but there is nothing—nothing—fake about this band's ability to party. It's a muggy afternoon in August,

and Cerebral Ballzy are chilling in a local backyard. They've just returned from a handful of West Coast dates, which means Mel (bass) and Abe (drums) are still recovering from the drive straight home from Denver.

"Thirty-six hours," says Abe, cheerfully rolling a joint underneath the porch. "Twenty-six," says Mel, correcting the record from above.

"Yo, you a LIAR!" shouts Jason (guitar) from the kiddie pool in which he's standing. It's begun to rain, and Jason's hoping the pool will fill up. Earlier, he suggested lying in it for the photo shoot, wearing weed like

pasties. Instead, Mason (also guitar) is standing in front of a small shed, smoking three joints at once, oblivious to the rain soaking his shaggy hair. Meanwhile, Honor (vocals) is huddled against a wall, murmuring into a cell phone and clutching a jar of mushroom tea with brown, misshapen shards swirling at the bottom.

Though Cerebral Ballzy call Brooklyn home whenever they're not touring, Mason and Jason are from California. Both are familiar with Prop. 215,

and both have medical cards. "I hopped out of the van when I saw a hot girl spinning a sign that said 'Get your card here,'" Mason recalls.

With the exception of Mel, who began smoking pot at 17, the members of Cerebral Ballzy began toking around eighth grade. Supporting the legend that CB are serious blunt-blazers, no one claims any stellar stories: "I passed out," says Mel, "but doesn't everybody?" Honor worked as a weed-delivery guy in Manhattan for

a while, where he'd hit businesses ("Always kind of weird") and residences, too. "I met all kinds of people,"

he says. "It was a cool job."

Hopefully, these guys won't have to have "jobs" for a while. Summer saw the release of several videos, including the much-talked-about "Junky for Her," which featured blood, puke and hot chicks. And by the time you read this, Cerebral Ballzy will have thrashed and ollied their way through the US with hardcore supergroup OFF! and will be busy schooling European audiences in the fine arts of shredding and smoking. *Polly Watson*

**There is nothing—nothing—fake about this band's ability to party.**





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Bassist Sandy Miranda and singer Damian Abraham.

bipolar disorder when, out of desperation, he asked Fucked Up bassist Sandy Miranda and the group's roadie for a few hits during a festival date in Holland.

Unlike most straight-edgers, however, Abraham never condemned marijuana before he started medicating with it. "Militancy is always gonna be the fallback point of people that are scared," he says. "The most militant [straight-edge] friends I've had are now alcoholics or doing coke. It's kind of sad that it's become something that you get bullied into."

Though Miranda had been smoking since 2001 to deal with her insomnia, Abraham is only now applying his obsessive-geek sensibilities to the brave new world of weed. Their Sacramento homies in

## FROM STRAIGHT-EDGE TO FUCKED UP

The hardcore band with the radio-unfriendly name takes a hit.

Nowadays, punk rock has become a familiar rite of passage: You hit your teens, attend a few shows, adopt the ideals, then toss them aside once the people around you fail to live up to them. And then, if you don't become a crusty for life, you make your Faustian pact with the rest of society. Or you become Fucked Up and let anyone who ever cared about punk wonder how you did it.

For, against the odds, the notorious Toronto punk rockers have won the Polaris Prize in Canada for best rock LP (2008's *The Chemistry of Common Life*) and seen their latest album, *David Comes to Life* (Matador), declared one of the year's best in magazines that can't even print the band's name. Of course, any group that marries prog-rock exploration with harsh aggression already has no problem with cognitive dissonance. So building a rock opera around David



**"The most militant [straight-edge] friends I've had are now alcoholics or doing coke. It's kind of sad that it's become something that you get bullied into."**

Eliade (a recurring character in the group's mythology ever since their first major LP, 2007's *Hidden World*) and his struggles with love, loss and

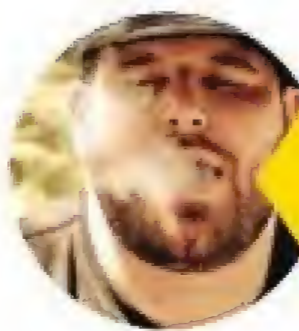
fate only makes sense.

"David Eliade emerged when we were hitting a point where a lot of kids in hardcore were like, 'This band's getting too weird,'" recalls vocalist Damian Abraham. "He gave us ways to write about things that I think a lot of kids who knew us from being hardcore kids would not wanna hear us write about."

Abraham also gave his fans in the straight-edge world—and, potentially, his new employers at Much Music, where he hosts the indie music showcase *The Wedge*—something more to complain about when he came out as a medical-cannabis smoker. Abraham tells us he'd already weaned himself off Ativan for

Trash Talk introduced the two to blunts and also taught them the difference between *indica* and *sativa*. And since Fucked Up has always been a notoriously fractious social unit, marijuana is proving useful when it comes to keeping the peace during their frequent tour jaunts. "It's so hard being with five other people all the time in the same cramped space, so things can get a little tense at the end of tours," Miranda notes. "But not anymore. It's been really chill because, when you smoke, you just kind of focus on the good things and not the bad things—like why you'd be angry with your bandmates for whatever reason."

Justin Hampton



### Fucked Up Facts

► Damian served as a Fox News Correspondent on "Red Eye".

► Damian hosts "The Wedge" on Canada's MuchMusic network.

► Won the 2009 Polaris Prize in Canada for Best Rock LP.





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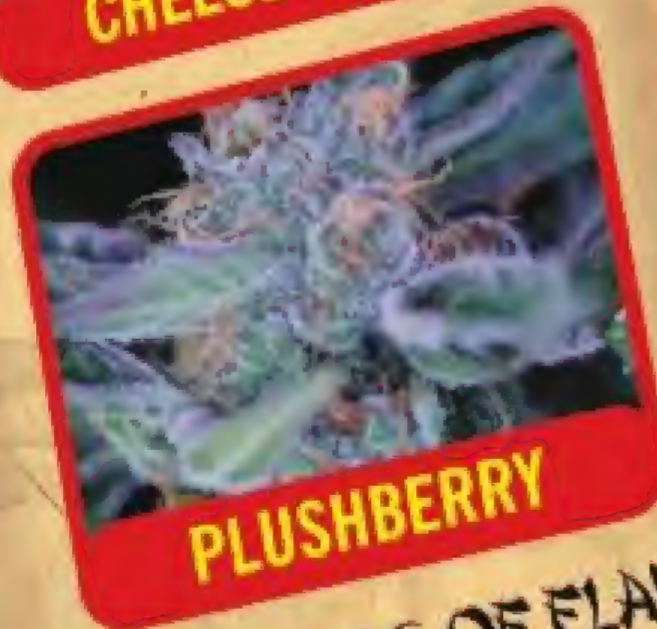


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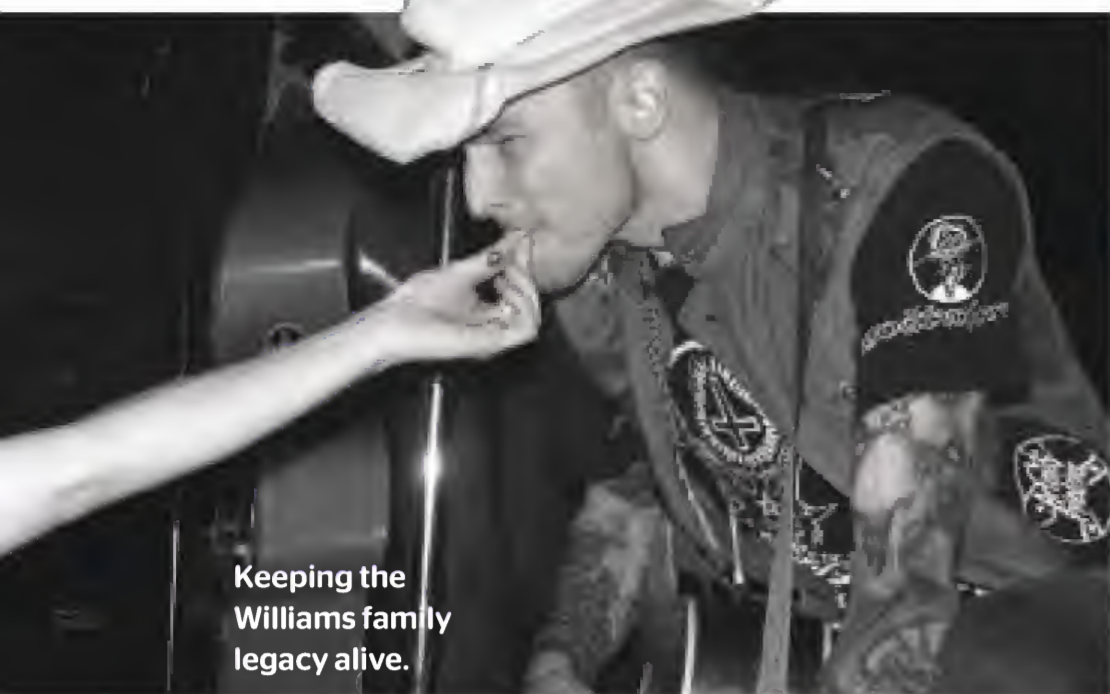
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## EXILE ON MUSIC ROW

Giving Music City and his old label the kiss-off, Hank Williams III releases three simultaneous albums.

**This much we** know about Hank Williams III: He has no qualms about genre-hopping, and he likes to do it on his own terms. So to celebrate the acrimonious split from his prohibitive Nashville label, the grandson of the country legend set out to declare his independence by simultaneously releasing three new records (one of them a double

### Hank III

*Ghost to a Ghost / Guttertown*  
*Attention Deficit*  
*Domination*  
*3 Bar Ranch Cattle Callin'*  
(Hank3/Megaforce)

album)—each recorded in a crude home studio and focusing on a different facet of his musical repertoire.

*Ghost to a Ghost*, the country half of Williams' stripped-down twofers, easily stands out as the best of the records. By the time the third track, "Riding the Wave," kicks in, his dark edge is exposed and the record flows with unhitched energy. "Ray Lawrence Jr.," an extended duet with the underground legend, could easily be a mainstream hit, and Tom Waits's appearance on the title track is appropriately haunting. *Ghost's* flipside, *Guttertown*, focuses more on bayou-stomping Cajun compositions and is the most vibrant of the records.

*Attention Deficit Domination* indulges Williams's sludge metal tendencies, though the thin sound detracts from the climactic doom. Still, there are some redeemable moments, especially "Demons Mark" and the terrifying "Goats 'n' Heathens." The last of the albums, *3 Bar Ranch Cattle Callin'*, is essentially a platter of math-metal guitar noodling layered with audio of a fast-talking cattle auctioneer, both fascinating and repellent. But for all the experimentation presented on these three albums, what's missing is the wallop of Williams' patented "hellbilly" sound, a blend of raucous rockabilly and punk tempos that's uniquely his own, yet remains virtually untapped. *Zena Tsarfin*

## BOOK RECOMMENDATIONS



**Ed Sanders**  
*Fug You*  
(Da Capo Press)

Among his many accomplishments, polymath Ed Sanders co-founded the Fugs (a euphemism for 'fuck' used by Norman Mailer) in 1964. The first underground rock stars, the Fugs—consisting of Ed, Tuli Kupferberg and Ken Weaver—sang of smut ("Bull Tongue Clit"), war ("Kill for Peace") and

the emerging freak culture ("Slum Goddess"). This brilliant memoir not only chronicles the band's early days, but paints an outrageous, inspiring picture of life among the artistic outlaws of New York's Lower East Side in the '60s, written in Sanders's singular neologistic prose. *Michael Simmons*

## MUSIC REVIEWS



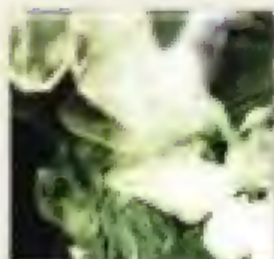
**Das Racist**  
*Relax*  
(Greedhead)

It takes an enterprising type of stoner to jump from the success of a novelty track "Combination Pizza Hut and Taco Bell" to a hyperactive representation of the Desi experience in hip-hop. So the Brooklyn-based Das Racist crew deserves some credit for expanding the cultural role

of South Asians in the game.

Unfortunately, the baby talk that was once funny, is now just aggravating. Even worse is when could-be MC hero Heems positions himself for the attack on the muscular "Shut Up, Man," then walks away when he should be drawing blood.

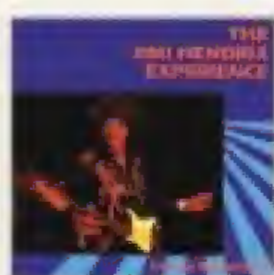
*Justin Hampton*



**Nappy Riddem**  
*One World Sovereignty*  
(Fort Knox Recordings)

World music is alive and well in the nation's capital: Rex Riddem and Mustafa Akbar of Nappy Riddem have combined funk, soul and reggae, creating a new style of fusion Afrobeats. Danceable and definitely smokeable, the new album from the DC duo draws upon conscious hip-hop and

lets it flow. "DTA (Dreadlock Transit Authority)" is a straight raga joint banging with sexy bass lines emanating from Thievery Corporation's Ashish Vyas. Also collaborating is the voice behind the *Boondocks* theme song, DC's own Asheru. This socially aware album is not to be missed. *Natasha Lewin*

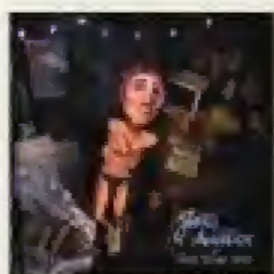


**The Jimi Hendrix Experience**  
*Winterland*  
(Experience Hendrix)

*Winterland* captures the legendary guitarist live at his artistic apex and full of loose confidence. The album is a surreal spaceship that sonically flies you back in time to witness Jimi ripping the roof off the joint. *Winterland* was recorded at the legendary San Francisco venue in 1968 over three

nights, two shows a night, in front of 5,400 people, and features the very best songs from these epic shows. The extended versions of "Like a Rolling Stone" and "Are You Experienced?" (with flute solo!) are pure gold. Best of all, the sound quality is crisp and top-notch. Buy it.

*Rob Cantrell*



**Jane's Addiction**  
*The Great Escape Artist*  
(Capitol Records)

For one brief moment, Jane's Addiction were the finest hard rockers on the planet, with heavy guitars crashing over an epic, tribal throb and drone. Now, 23 years later, they've finally recorded a worthy follow-up to their heat-seeking first album, *Nothing's Shocking*. Though not as gritty as

that initial effort, *The Great Escape Artist* is quite tight and focused, rediscovering the woozy, swooning way their songs build into anthems. Producer Dave Sitek (TV on the Radio) plays a key role here, polishing the band's sound without sacrificing its mystery.

*Chris Parker*



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## The Organization of Teratology Information Specialists regards the data on marijuana as somewhat dubious.


On my first visit to the OBGYN, I was given an info packet that included a fact sheet listing the dangers of marijuana, speed and cocaine. The sheet explained that using any of these substances while I was pregnant could result in such problems for my child as low birth weight or slow motor-skill development.

But is it really fair—or accurate—to include cannabis in the same category as these other harmful substances? Mainstream medicine certainly seems to err on the side of caution. Some medical sources claim that marijuana use may cause premature babies, while others warn of behavioral and learning problems.

But the Organization of Teratology Information Specialists (OTIS), which publishes findings about the potential birth defects caused by different substances—everything from hair dye and mercury to crack cocaine—regards the data on marijuana as somewhat dubious, whereas its warnings against hard drugs are far more straightforward. For example, according to OTIS, speed “can cause miscarriage, prematurity ... and neurological effects, such as tremors and too much or too little muscle tone, which can last for several months.”

However, regarding marijuana, OTIS says that “the frequency of birth defects was not higher than expected in the babies of 1,246 women who reported ‘occasionally’ smoking marijuana during pregnancy.” Of the studies showing behavioral problems in these children, such as impulsiveness and poor academic performance, OTIS says that “the evidence is not conclusive and some studies report conflicting results.”

And what about prescription drugs? According to “The Risks (and Rewards) of Pills and Pregnancy,” published in the June 8, 2009, issue of *Time* magazine, some two-thirds of women take as many as five different drugs throughout the course of their pregnancies. However, red flags are being raised, including for many prescribed pharmaceuticals. For example, the FDA issued a warning in July 2006 that Zoloft can put babies at higher risk of persistent pulmonary



An occasional  
toke is nothing  
for expectant  
mothers to  
stress over.

## POT & PREGNANCY

Contrary to mainstream medical advice, pot is a relatively innocuous balm for certain pregnancy symptoms, including morning sickness, mood swings and back pain. *by Jenna Humphrey*

**When I learned** that I was pregnant, I immediately wondered how I was going to give up weed, which has been an important element of my lifestyle. In San Francisco, where I live, marijuana isn't viewed as a drug—and, for my part, I always possessed a casual attitude about its allegedly negative effects on my health. But since I wanted to give birth to a healthy child, I was motivated to research the issue of pot use during pregnancy.



hypertension (PPH), which can result in death if left untreated, while a study published in the *Archives of General Psychiatry* in July 2011 linked the use of SSRIs (antidepressants) to autism, raising the risk a whole percentage point (from 1 to 2 percent). Plus Pfizer, the company that makes Zoloft, is now being sued by women whose babies wound up with birth defects, including PPH, gastroschisis, club foot and cleft palate, as well as heart, head, skull, brain and spinal-cord defects. Whether these claims are valid can be difficult to assess: Birth defects occur in 3 to 5 percent of newborns, and some of those women inevitably took Zoloft.

Other prescription drugs past have produced tragic outcomes in the past, demonstrating that what the medical profession deems benign one day may create nightmarish problems later on. Take the estrogen pill diethylstilbestrol (DES), which was administered to pregnant women from 1938 to 1971, mainly as a preventative measure against miscarriage. As it turned out, DES did not end up preventing miscarriage, though it did cause rare forms of uterine and ovarian cancer in girls as young as eight years old. It also caused infertility, autoimmune disorders and (for some men) genitalia problems.

Then there's thalidomide, a drug used to treat morning sickness in the late 1950s and early 1960s. Roughly 10,000 children were born with phocomelia, a limb disorder in which the arm (and sometimes leg) bones fail to develop, resulting in flipper-like limbs. As many as half of the babies born with phocomelia died in their first year, and those who didn't were permanently handicapped. In short, trusting pharmaceuticals that haven't been in use long enough to show their true colors is a scary proposition.

Marijuana, on the other hand, is *not* an unknown drug—in fact, a long history of its use during pregnancy exists. In 1993, a burial tomb from the fourth

century was unearthed in Israel. It contained the corpse of a 14-year-old with a skeletal fetus in her pelvis. Material in her abdomen was revealed to be delta-6-tetrahydrocannabinol, which is derived from cannabis. Researchers concluded it had been administered during labor.

The *Bencao Gangmu*, a Chinese medical text from the 16th century, states that hemp-root juice will safeguard against post-birth hemorrhaging. French doctors made similar claims in 1880—and today, midwives still use cannabis to help with labor pains.

All of which makes it clear: The dangers of cannabis are nothing like those posed by hard drugs, prescription drugs, or even cigarettes and binge drinking. So why has marijuana use been condemned by doctors and in the medical literature?

Melanie Dreher, Ph.D., RN, FAAN, is the dean of the College of Nursing at Rush University. She co-directed several anthropological studies that examined the use of marijuana by pregnant women in Jamaica. “In a society that condemns marijuana,” she notes, “organizations have to be careful how to present their opinion. They rely on political opinion for donations and funding. If people think they're a drug-dealing organization, they won't contribute. It's the same with physicians: Marijuana is illegal, and they don't want their license taken away if they're caught prescribing marijuana. Anyone dependent on government opinion has to be careful. It's not just their financial interests—it's who they are. If you've worked very hard all your life to become a physician, it's about not being able to serve your community, your patients, to never be able to practice again ... it's really a big deal.”

Beyond the politics involved, studies that show a harmful effect on fetuses may very well be producing false positives based on other lifestyle factors. A 2004 National Survey on Drug Use and Health found that pregnant pot smokers tended to be younger, poorer and less educated. They were also less likely to take folic acid and more likely to smoke cigarettes and drink alcohol. When these variables were accounted for, the correlation between marijuana and birth defects was rendered meaningless.

That's why Dreher's Jamaica studies (see “Jamaica's Culture of Medicine,” Jan. '12 HT) are so valuable. “My sample had no other drug use,” she points out. “In the United States, it's almost impossible to get a clean sample like that, so it's very hard to tease out the marijuana piece. Consequently, it's hard to evaluate the outcomes.”

Of the Jamaican children she observed for five to six years after birth, Dreher says: “There were children with learning disabilities and children who were geniuses. It was completely noncorrelated. It had much more to do with lifestyle; it didn't have anything to do with exposure to marijuana.”

A common piece of rhetoric these days is that an expectant mother should never do *anything* that could potentially harm her child. But Dreher suggests a more balanced and sensible approach. “The uterus is an amazing organ that provides a lot of protection,” she says. “Women should get rest and prepare for being good mothers—that's our responsibility to our children. But an occasional smoke of marijuana or drink of beer is not going to do bad things for anyone, and I don't want women to feel guilty about that.” 🌿

## The *Bencao Gangmu*, a Chinese medical text from the 16th century, states that hemp-root juice will safeguard against post-birth hemorrhaging.

### BRIEFS

#### Canada's Cannabis Mess



Ten years ago, Canada legalized the medical use of marijuana. However, Health Canada, the government agency directed to

implement a system of safe access, has mismanaged the program to the point where they're looking to get out of the whole business. Instead, the government is proposing that doctors sign off on patients' requests to use medical

marijuana. Unfortunately, Canadian doctors don't like the idea because pot, they say, is largely an untested and unregulated substance that they know little to nothing about. Dr. John Haggie, president of the Canadian Medical

Association, commented that doctors would be “kind out of out there, without any infrastructure around them to assess it, to monitor it and to know if they were doing the right thing. I don't think that it's appropriate or fair.”



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The friend knew Robin's cooking, and asked if she could make up some medicated goodies to get her son the dosage recommended by their doctor. After that, both their lives changed forever. The young man hasn't had a migraine since and Robin found her cannabis cooking calling.

### MUNCHIES

## FOR YOUR SWEETHEART

With the February issue of HIGH TIMES coming up at the same time as me and my sweetie's six-month mark, I asked my bud Robin if she could think up any Valentinesque canna foods. These candies were a home-run mood-sealer, which came as no surprise. Robin's been the personal chef for NorCal marijuana greats like the late beloved Jack Herer and the now-incarcerated Eddy Lepp.

Ten years ago Robin became a medical marijuana patient under California Prop 215 at the same time as her good friend's son, who'd suffered debilitating migraine headaches his entire life.

Soon after Robin joined Eddy Lepp's Cannabis Ministry in Upper Lake, California, Eddy tapped her as his personal chef for weekends, parties, holidays and fundraisers. Her powerful and delicious dishes gained in notoriety over the years and she was recently approached by director Cle "Bone" Sloan to create "The greatest cannabis cooking show of our time, 'Cooking With Robin.'"

Now that I've had Robin's cooking, I know the show will be solid, but as a side note, if these chocolates are any indicator, I'm already sold. Robin's butter method is strong and smooth. And like I said before, the one piece of mouth-watering, high dose sugary goodness was the perfect mood setter for a romantic night in. —Mary Ought Six

### CANNA CHOCOLATE MACADAMIA NUT CANDY

- 1 package (14 oz) caramels
- 2 tbsp water
- 2 tbsp canna-butter
- 2 tbsp hashish
- 2 cups coarsely chopped macadamia nuts
- 8 oz chocolate-candy coating, coarsely chopped

*Note: You can substitute any of your favorite nuts in this recipe.*

#### Directions

To make the canna-butter, combine a quarter-ounce of cannabis leaf, two cups of water and four tablespoons of butter in a pan. Cover and simmer for one to two hours. Strain through cheesecloth over a bowl. Cover and refrigerate. When done, the butter will harden and separate from the water. Toss the water.

In a microwave-safe bowl, combine the caramels and water. Microwave uncovered on high for three to three and a half minutes, stirring every 30 seconds until melted and smooth. Stir in the canna-butter and hashish until creamy and smooth. Stir in the macadamia nuts. Drop by tablespoonfuls onto greased baking sheets. Freeze for 15 to 20 minutes or until the clusters set.

Put the candy coating in a microwave-safe bowl and microwave uncovered on high for one to two minutes, stirring every 15 seconds. Stir until smooth. Using a spoon, dip the caramel clusters in the melted coating; allow the excess to drip off. Place on waxed-paper-lined baking sheets. Chill until firm. *Stones up to 30 (one candy per dose).*



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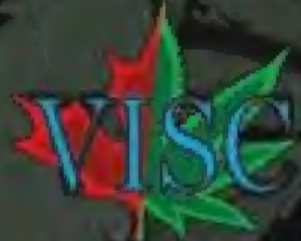


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STATE	CITY	STRAIN	PRICE	
Arizona	Phoenix	Headband	\$375	
		Blue Dream	375	
		White Rhino	300	
California	Los Angeles	Obama OG	350	
		Sonoma Coma	325	
		Granddaddy Purple	325	
		Super Lemon Haze	275	
		Bubba Kush	300	
	San Diego	Blue Dream	300	
		Strawberry Kush	400	
Florida	Daytona Beach	Cheese Quake	300	
		Bubba Kush	350	
	Palm Beach	NYC Diesel	350	
		Pensacola	Skunk	325
Hawaii	Honolulu	Death Star	450	
	Maui	Banana Kush	300	
Kentucky	Louisville	Blueberry	300	
Maine	Lebanon	Pineapple Chunk	300	
		Super Silver Haze	300	
Michigan	Detroit	Sour OG Kush	450	
		Sour Diesel	450	
		Granddaddy Urkel	450	
Nevada	Las Vegas	Strawberry Cough	275	
New Jersey	Hoboken	Super Silver Haze	400	
New Mexico	Albuquerque	Purps	480	
New York	Hudson	Big Buddha Cheese	330	
	New York	Kandy Kush	380	
		Haze	320	
North Carolina	Salisbury	Cataract Kush	400	
	Smithfield	Kush	300	
Oregon	Cottage Grove	Jack Herer	260	
		Chocolope	320	
		Super Lemon Haze	280	
Pennsylvania	Pittsburgh	Chocolope	360	
Tennessee	Nashville	Hydro	600	
Texas	Killeen	Blue Widow	240	
		Lemon Haze	280	
Virginia	Harrisonburg	Jack Herer	400	
		Bubba Kush	410	
		Thunderfuck	355	
	Matanuska	Virginia Beach	Blue Dream	350
Washington	Seattle	Silver Haze	275	
		Northern Lights	260	
		White Widow	290	
Wyoming	Sheridan	Trainwreck	300	
		MK-Ultra	310	
		Sour Diesel	290	
INTERNATIONAL				
Canada <i>(prices listed in Canadian dollars)</i>	Montreal	Cheese	C\$200	
	Toronto	Blueberry	175	
	Vancouver	Granddaddy Purps	210	

INDEX WATCH

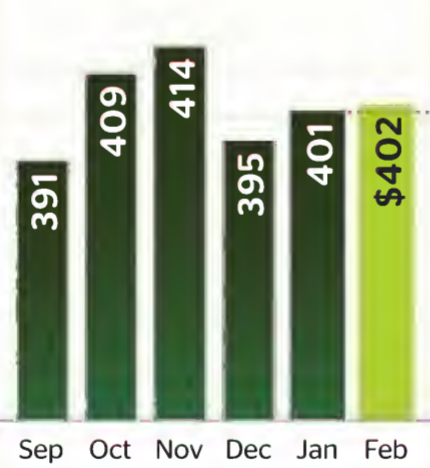
Prices by the ounce

The US Price and Kind indices held steady, closing February within a dollar of January's average. Mids saw a substantial increase in submissions, and jumped \$31 to an average price of \$289 (a four-month high). Schwag dropped \$17, finishing close to its 2011 average price of \$102.

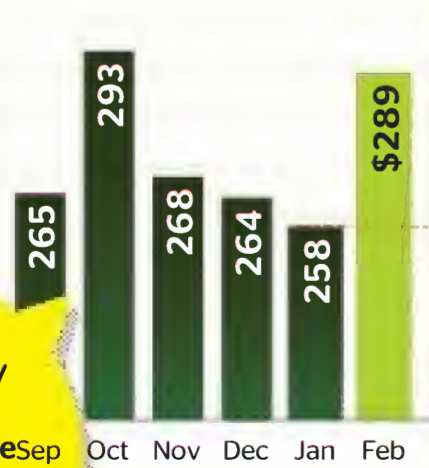
**US Price Index**  
 YTD Average: \$316



**Kind Index**  
 YTD Average: \$402



**Mids Index**  
 YTD Average: \$274



**Schwag Index**  
 YTD Average: \$114



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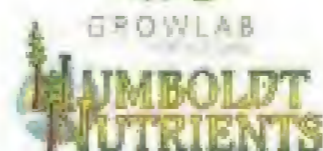
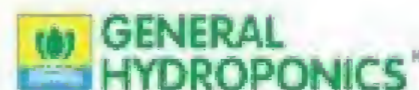
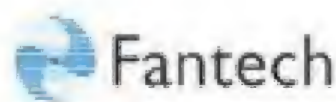


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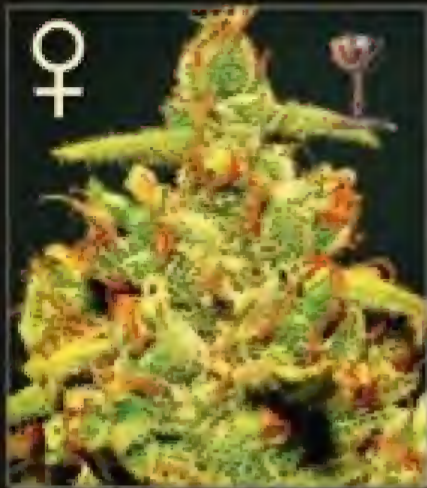


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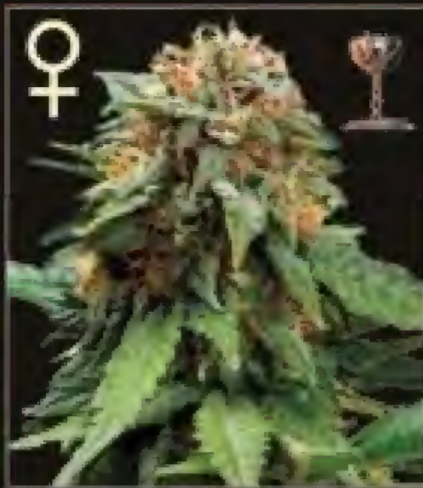
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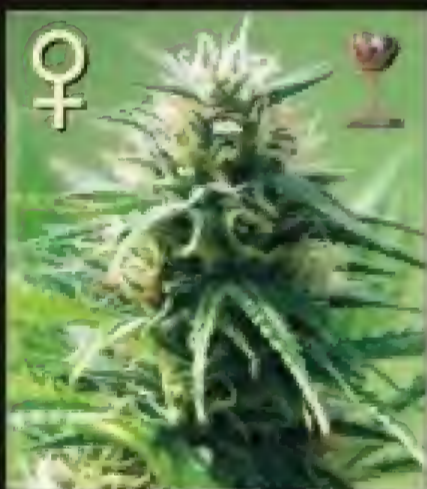
**LSD**



**Top Dawg**



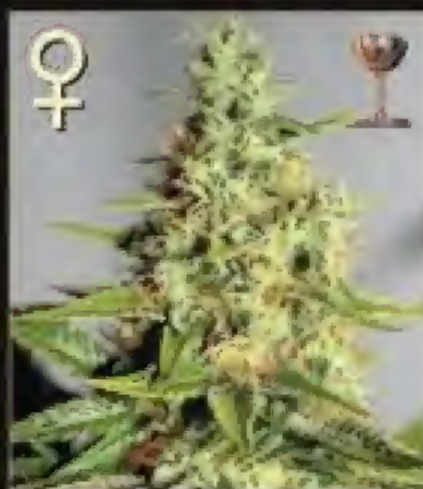
**Amnesia Lemon**



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**Night Shade**



**Honey B**



**8 Ball Kush**



**Red Dragon**



**Red Diesel**



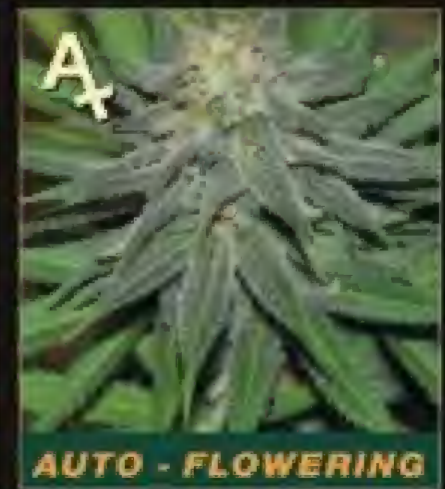
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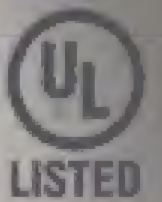


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# 2012 Hydro Grow Report



*Soilless growing is nothing new, but mastering indoor hydroponic farming to maximize yields requires a full understanding of the history, fundamentals and future of water culture. We break down all of the essential products and techniques to show you how to achieve sensi success, harvest after harvest.*

*By Erik Biksa and Danny Danko*



# Cue the Waterworks

Hydroponic growing has existed for centuries, going back at least to the days of the Hanging Gardens of Babylon, one of the Seven Wonders of the Ancient World. Over the last few decades, however, the technology for growing without soil has exploded, and there are now many different kinds of hydro systems out there that can be tailored to suit your needs. Whether they use an ultra-fine mist, mimic the natural movement of tides or even deliver a constant stream of nutrient solution, these systems all share a common trait: They deliver water, food and oxygen to the plants' roots for optimal growth. Sure, growing in soil does that, too—but in soil gardens, you feed the soil, which in turn feeds the plants. With hydro growing, the plant food goes directly to the roots for optimal uptake.

Without a colonized medium buffering what the roots need, a direct relationship exists between what a grower supplies in the nutrient solution and what the plants take up, creating the potential for massive nutrient-absorption rates that will lead, in turn, to heavier and



**From top: A rooted clone ready to transplant into its hydroponic growing medium; Two hydro tables exhibit explosive growth.**



stickier buds requiring shorter grow times.

Many underground cannabis growers favor hydroponics for quicker harvests as well as the added benefit of not having to haul bags of soil or soilless mix to and from their grow

locations. Speed and stealth are important considerations when risking one's liberty to grow a crop.

Today, with medical-cannabis cultivation becoming so widespread, one of the trends in ganja growing has been to simplify things, making it easier and more affordable for the less-experienced "hobbyist" grower to develop a reliable source of high-quality medicine. As a result, we see a lot more "dirt" (or, technically, soilless-mix) grows out there than we used to—and why not? The harvest rates are respectable, and the crop quality can be superb. Also, many less-experienced growers appreciate the forgiving and flexible nature of soil.

So where does that leave hydroponic growing methods such as aeroponics, NFT (nutrient-film technique), ebb-and-flow (or flood-and-drain) and DWC (deep-water culture)? In fact, indoor growers have more options than ever. The newest systems available have more refinement and ease of use built into them, and many are geared specifically to the budding home grower. It wasn't very long ago that you had to build your own system from scratch, especially if you wanted to grow giant cannabis plants. The few systems available in the old days were designed for general-purpose growing, such as lettuce and vegetable crops with shallow root systems and fast





These plants were started in rockwool cubes and transplanted into trays filled with expanded clay pellets.





turnaround times.

These days, however, cannabis growers can select from a huge variety of configurations and system types that perfectly suit their skill level and personal needs. Sure, these setups use many of the same principles that were developed by the early hydrogrowing pioneers, but their refinement, cost, ease of use, and level of technical support and information make them a great choice for growers of any skill level who are looking to automate their grows, gain bigger yields, reduce watering

requirements, speed up growth rates, and avoid the labor and expense of replacing large amounts of grow medium between crops.

The debate will likely rage on forever among growers as to which is “better,” hydroponics or soil, but even the saltiest soil grower won’t argue with the proposition that you just can’t beat the growth rates achieved by hydro. Want a big plant? You can vegetate it for two months in soil or for about half that time (five weeks) in hydro and wind up with a

From top: Recently transplanted clones get ready to build roots during their vegetative stage; A tray of rooted cutting awaits its fate.



## Must-Have Hydro Products

2012 Hydro Grow Report

### pH and TDS Meters

A measure of acidity to alkalinity, pH typically plays a strong role in determining how available different

nutrients are to your plants. In general, a pH range of 5.5 to 6.3 is considered optimal for most hydroponic growing systems and mediums.

If you want good results with hydro, you’ll definitely need to monitor and adjust the pH and TDS (total dissolved



pH and TDS meters are an absolute must for hydro growers.

solids) levels that your plants receive via the nutrient solution that you mix in your reservoir. Electronic meters or monitors are the best way to establish constant control. Growers can choose

from single-purpose and inexpensive “pen-type” testers to multi-meters that continuously monitor important hydroponic parameters like pH, TDS or EC (electrical conductivity), and nutrient temperature. Some devices even act as controllers and make automatic adjustments in real time as needed.

TDS is most often measured in EC or ppm

(parts per million). This measurement tells growers the relative concentration of nutrient ions that are present in the reservoir—or, in simpler terms, the strength of the plant food that your crop is receiving. This is important to know, as over- and under-feeding are two common sources of poor yields and other problems in medical cannabis crops.



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plant of similar stature. The choice is yours.

### A Ph.D. in H<sub>2</sub>O

Water quality is a big factor in growing healthy plants, and growing with hydroponics is no exception. For the biggest and tastiest buds, you need to start with the best quality water. Tap water that has a lot of impurities will lock up nutrients, creating deficient plants that yield poorly and are susceptible to diseases and pests. The chlorine in tap water also kills off the beneficial microbial life that helps plant roots (something that's crucial for soil growing as well), so always let tap water sit out uncovered overnight to allow the chlorine to dissipate.

Whether you grow using soil or hydro, it's a good idea to use the best quality water possible. Inexpensive purified water is available in 5-gallon jugs at your local grocery store, but that can still get costly if you have more than just a few plants, so larger-scale growers should consider cleaning their water at home.

RO (reverse osmosis) filtration systems remove nearly 99 percent of the impurities from your tap water and come in a wide range of sizes to suit your budget and needs. Many growers who've made do without such a system are often astounded at the improvements they see in their plants after making the switch. After all, most of us



### Aeroponics

Typically reserved for "advanced" hydroponic growers, aeroponics uses a mist or spray infused with oxygen and nutrients to keep your plants fed, watered and breathing in lots of O<sub>2</sub> in the root zone. The result? Unparalleled growth rates and the potential for massive yields.

are careful about the water we drink, so why shouldn't we do the same for our favorite plants?

Cannabis has a proclivity for absorbing impurities, which makes hemp (if it's not for consumption) a valuable plant when it comes to detoxifying soils laden with heavy metals. Unfortunately, heavy metals like lead and mercury may be present in your water supply as well, so that's just

one more good reason to take a look at some type of water-purification system, RO or otherwise, for your medicinal crop. And don't worry: It costs far less than you might imagine.

### Large-Scale Hydro

Hydro growing was popularized by scientists interested in making commercial food production easier and in improving the yields of plants

## Drain to Waste: Pros and Cons

### ADVANTAGES

- **Fresh solution every time:** No imbalances or transfer of pathogens.
- **Easy to manage:** Mix it once and forget it—no continuous monitoring required.

### DISADVANTAGES

- **Increased water use:** Compared to recirculating closed-loop systems, you may use more water.
- **More expensive:** Compared to recirculating systems, you may find yourself buying the bigger jugs at the hydro store.
- **Waste management:** Every time you water, you need to channel the runoff responsibly—and that adds up quickly!



for every square foot of dedicated grow space. So why not put all this science to work for you?

Sometimes newer growers are intimidated by the idea of growing their plants hydroponically (as are commercial growers with plenty riding on the line). And, as mentioned earlier, there will always be a debate over which method is better—hydroponics or soil—in terms of crop quality and overall yield. However, few experienced growers would argue with the growth rates and ease of automation that hydroponics offer.

Today, one of the biggest

### Must-Have Hydro Products Continued:

#### pH Up and Down

Usually referred to as adjusters, these are concentrated acids or bases that are added as necessary by the



**Using pH up and down to adjust acidity and alkalinity are essential to plant health.**

grower (or via dosing equipment) to create and maintain pH levels that are in the optimal range for nutrient absorption. While there

are some organic choices available, most growers opt for synthetic chemical concentrates because they're inexpensive, easy to use and (when used in moderate amounts) will not adversely disrupt the balance of nutrients in your reservoir. If you have to use a lot of pH adjusters in your system, however, you likely have poor-quality water and should consider

RO filtration. (See "Cue the Waterworks" above.)

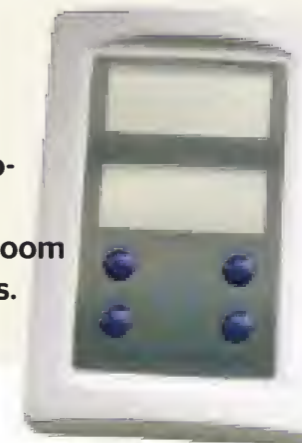
#### Hygrometer/Thermometer

Aside from the root zone, you also have to pay close attention to the aerial

**A hygrometer provides a full understanding of growroom climate conditions.**

environment of the plant, and this means watching and controlling the temperature and humidity level during both the light and dark cycles. Most strains prefer a

range of 70°F to 82°F. Experienced growers will tell you that the most important thing your crops need besides light is





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By Herbie Drostien

trends in ganja growing is raising monster-sized plants. In soil, one of the drawbacks to this is the longer vegetative growth time required, especially for many popular Kush strains, before the plants are flipped to the budding cycle. This can mean upwards of a couple of months of vegetative growth time for plants that finish around the 6-foot



A professional feeding reservoir can handle hundreds of gallons of nutrient solution.

mark and yield more than a pound indoors. But instead of taking two months, a highly oxygenated hydroponic system filled with high-quality nutrient solution (and with lots of room left over for the roots to grow) can produce the same size specimen in five weeks or less, all other things remaining equal except for the switch from soil to hydro.

Growers who haven't yet tried it are often convinced, for one reason or another, that hydro is difficult and will require more of their time. While there are some fundamentals you'll definitely need to learn, hydro can also be a big timesaver—not only in terms of cropping time,

### A KICK IN THE NUTES

Let's examine that age-old cultivator's question: What do I feed my plants (and how much)? If you ask the large nutrient manufacturers, they'll point you to an expensive multi-product line and suggest that you feed your garden as much as you possibly can without killing your plants. If you ask an earth-mother type, she might suggest that messy, smelly organic teas and vegan composts are the route to go. Both of these examples can yield amazing cannabis, but neither is a very scientific approach. The best way to determine what we feed our plants is to start examining their nutrient uptake profile and work from there.

### NUTRIENT UPTAKE PROFILE

Nutrient profiling is a way of looking at a given nutrient product and identifying its elemental makeup. The so-called "N-P-K numbers" (for nitrogen, phosphorus and potassium) are the most common way to compare nutrient products, but a complete nutrient profile would cover more than just N-P-K; it would also include all of the minor elements that a plant needs to survive. Imagine that we have a nutrient solution and know exactly what its profile is. Now let's take that nutrient solution and run it through a hydro system for a period of time. If we then re-evaluate the solution's nutrient profile after it's been used, we should be able to determine exactly what nutrients the plants have taken up and how much they've used. This is how a plant's nutrient uptake profile is determined, and it's powerful information: With this info, we can mix a nutrient solution that has exactly what our plants need in the correct proportions.

### THE FORMULA

The Lucas formula is an approach to feeding your plants based on horticultural science and plant biology rather than the marketing propaganda of nutrient manufacturers.

Also known as the Lucas ratio, the formula is a simple method for mixing nutrient solution in proportions that are tailored to the cannabis plant's nutrient uptake profile. You can mix a Lucas formula from any nutrient brand, but in this article we'll be using the Flora line of nutes from General Hydroponics.

One of the first things you'll notice when you look at the Lucas formula as applied to GH's Flora line is that you don't have to use any of the Grow formula—and that's not a mistake. The Micro part of this three-part line has all of the nitrogen a garden needs, and since the Lucas formula is a "less is more" strategy, you can skip using the Grow part altogether. You should also change your reservoir once a week and top it off daily with pH-adjusted water.

VEGETATIVE MIX per gallon		FLOWERING MIX per gallon	
0 ml	GROW	0 ml	
5 ml	MICRO	8 ml	
10 ml	BLOOM	16 ml	

The last week to 10 days of flowering should be used as a flushing period, so all you'll need is to keep your reservoir filled with fresh, clean, pH-adjusted water.

This feeding system works extremely well in hydro systems because the low ppm of the nutrient solution is unlikely to clog your hydro lines. Also, since there's no organic element to this mix, it's a good opportunity to use hydrogen peroxide in your water. You can mix 15 ml of 3% hydrogen peroxide into every gallon of water you put into your reservoir. The hydrogen peroxide will kill off any algae or fungus that can grow in a reservoir, and it also releases oxygen to the root zone.

Great results can be achieved with this simple mix, and all you need are three things: GH Micro, GH Bloom and hydrogen peroxide. You can feed a small hydro garden with a 10-gallon reservoir for two cycles using this mixture (for a cost of about \$35), and you'll find that the end results are nothing less than spectacular.

Check out [hightimes.com/lucas](http://hightimes.com/lucas) for a full nutrient uptake profile chart.

### Must-Have Hydro Products Continued:

optimal temperature. At the least, you need a room thermometer—or, better yet, one that also tells you the minimum and maximum temperature since the last time you checked.

Humidity is a factor that is often overlooked, even by experienced growers. Some

have a tendency to think that lower is always better, which is another common mistake. It depends on the strain and phase of growth, but usually 45% to 65% RH (relative humidity) is optimal. This can be measured and even recorded throughout the day using a hydrometer.

If you grow, one of the best \$25-or-less investments you can make is to buy an

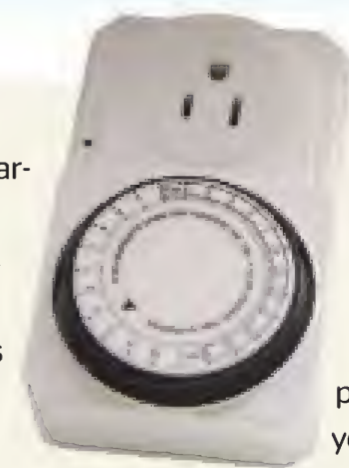
accurate combined digital hydrometer and min/max thermometer. The ones that come with a probe on a cord are especially useful, because then you can see what's going on in the plant canopy rather than just on the wall.

### 24-Hour Water-Pump Program Timer

Even if you choose soil over hydro, you can still easily

automate your garden for less work and bigger yields by controlling when your plants receive water and nutrients through the use

of a timer. The timer can also help you control how much solution the plants get—and since it's infinitely adjustable, you can achieve the



A water-pump timer allows multiple feedings per day.

perfect balance for your plants' relative watering needs during

both their vegetative and flowering stages.

Always use a grounded (three-pronged) timer, especially with water pumps:





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Individual drippers feed these plants growing in expanded clay pellets.

but also the time required for manual labor in the growroom. Manual watering is a real chore when you're looking at a big room full of plants—so much so, in fact, that crops sometimes suffer because growers are in a hurry or may have other priorities, even as their plants are calling out for water and nutrients.

Hydroponic systems can maintain a constant and balanced supply of oxygen, water and nutrients directly at your plants' root tips—unbuffered and with nothing to stand in the way of uninterrupted growth rates. Plus the changes can be observed rapidly in hydroponic systems when replenishing your nutrients on a weekly basis. This allows for a more tailored diet

for your buds as they develop, giving you the potential for bigger yields, better resin and fewer cropping problems. And don't forget that healthy and fast-growing plants tend to be more resistant and have fewer incidences of pests or disease.

### The Future of Hydro: More O<sub>2</sub> for Bigger Yields

As growing technologies continue to progress in terms of nutrients, lighting and environmental controls, the bar for yields and bud quality gets higher and higher (and so do the growers). Naturally, there has to be a limiting factor in all this, and it appears to be dissolved oxygen (DO).

Plant roots need oxygen, which is an essential component for growth. In traditional

gardening methods such as soil growing, DO levels are considerably lower than those found in even the most basic hydro setups. Increasing the level of DO that is available at the plants' root level leads to faster growth rates, healthier plants and bigger yields. That extra CO<sub>2</sub> you've been adding could prove useless if your crop is gasping for oxygen at the roots, since the plants can only grow as well as their most limiting factor allows. (Sorry, we didn't make that rule—it's just in the nature of things.)

DWC and aeroponics are two hydroponic growing methods well known for their ability to deliver significantly increased DO levels to your plants' roots, while leaving nothing standing in the way

of their absorbing water and nutrients, as is the case with systems that use great quantities of grow medium. That's right: In systems such as these, where the exposed plant roots are bathed (or misted) in a highly oxygenated nutrient solution, the growth rates and yields can be awe-inspiring—and this can even help to remove what would otherwise be a limiting factor to your potential for pot success.

### Deep-Water Culture

Easy and inexpensive to fabricate, DWC systems normally use opaque buckets or tubs to support plants in plastic mesh baskets affixed to the lid. The roots grow down into the nutrient solution, which fills the tub or bucket and is constantly aerated or "bubbled" by aquarium air pumps, air diffusers or similar. ✨

### Must-Have Hydro Products Continued:

A grounded timer helps avoid the risk of electrical shock, which is important when you have devices such as submersible pumps coming into direct contact with water. Timers that have a battery backup are also recommended, since your plants' schedules won't go all out of

whack in the event of a temporary power disruption.

### The Hydroponic Grow Tent (or Box)

If you want to start a small to midsize grow without much hassle but with lots of potential for great results, be sure to have a look at the



wide range of styles and sizes of prefabricated grow tents available. They set up and break down quickly, which is nice if you have to move in a hurry, and their setup is quiet, which means no loud power tools or noisy movement of building materials into your place.

Grow tents provide stealth and maneuverability.

For yields, you get six sides of highly light-reflective, and waterproof material that zips up to provide total darkness during the night cycle. People really short on space have been able to set up a grow right in their own bedroom with little intrusion, especially if they set the light timer to coincide with their own personal schedule.

You usually have two


choices in terms of covering material when selecting your grow tent: white or textured silver. Most growers go with the textured silver.

There are also a number of grow boxes on the market. Many are light-tight and designed to look like filing cabinets or storage units for the ultimate in stealth. These are great for a garage or fit nicely into an extra bedroom.





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**hitman glass** 



The art of dabbing: in one hand, this extract enthusiast heats the nail on this DNA Helix rig using a swirl ray-gun torch; in the other, he readies his wand with a dab of concentrate. Both pieces created for Hitman by renowned glass artist Banjo.

**“BHO is fast becoming the smoke of choice for pot snobs and cannabis connoisseurs across America.”**





# 'The Concentrate Revolution

Solvent-based cannabinoid extracts—and the new apparatus used to smoke them—are bringing hash-making into the 21st century. *By Bobby Black*

**E**VERY ONCE in a while, in the course of human history, a paradigm shift occurs—a new invention, innovation or idea that changes the way we do things forever: the printing press, television, the Internet ... In the realm of cannabis, there have been several such quantum leaps over the past few millennia: the rolling paper, the bong and, most recently, the vaporizer. Now, ushered in by the growing medical marijuana movement, we have reached the dawn of a new age—one that has stoners across the country carrying

around blowtorches and declaring 7:10 the new 4:20: *the era of the extracts.*

It used to be that there were two forms of cannabis to smoke: the plant itself and hashish—the trichomes, resin or pollen that had been removed from the plant. This was traditionally done by shaking them loose via ice water, sieving, pounding, rubbing or tumbling. The resulting residue or powder (called kief) would then be tightly compressed or mixed with a small amount of oil (often from the hands of the people collecting it) and pressed into balls, blocks or bricks. And voila—you have hash.

But in the past few years, a new method of separating the trichomes from

the plant—a method that also retains most of the terpenes (essential oils)—has been developed. This method involves shooting a highly pressurized gaseous solvent (such as oxygen, nitrogen, carbon dioxide or, most commonly, butane) through the plant material (a process often referred to as “blasting”), then purging away the remaining solvent and scraping up what’s left behind. This moist, gooey residue usually resembles raw honey, a resemblance responsible for its nickname: butane honey oil, or BHO.

There’s no denying it: BHO is fast becoming the smoke of choice for pot snobs and cannabis connoisseurs across America, and this new generation of



Closeup of Darby's ray-gun torch tube at work.





An impressive assortment of cannabis concentrates in custom dishes, with some "tools of the trade": paddles, picks and nails.

torch-toting extract enthusiasts also carry with them a plethora of new paraphernalia and an entirely new lexicon (see glossary on the next page). Terms like "dabber," "rig," "wax," and "John Hammond" didn't even exist in the world of weed a year or two ago—now, at any cannabis expo or trade show, they're all anyone is talking about. Concentrate use has become so prevalent, in fact, that in July 2011 the DEA introduced an entirely new category under the Controlled Substances Act specifically targeting marijuana extracts.

HIGH TIMES' first official encounter with BHO was in June 2010 at our inaugural Medical Cannabis Cup in San Francisco, when three BHOs were entered into the Hash category. By the time our next Medical Cup rolled into Denver in

April 2011, BHOs had become so prevalent that we had to change the name of the category to the Concentrate Cup. At our second annual San Fran Medical Cup in June 2011, a whopping 11 of the entries in the category were extracts rather than traditional hashes.

So what makes solvent extracts better than traditional hash? They're purer, more potent and far less time-consuming to make. Creating bubble hash takes hours of tumbling your weed in frigid ice water, then several stages of sieving through various sized screens or nets.

Butane extraction, when done properly, only takes about 15 to 20 minutes. There are several devices on the market that can be used to make concentrates (such as the Tamisium Chemical Extractor), but some stoners have figured out ways to make them with simple household items like turkey basters and coffee filters. Purging is achieved in one of two ways: either a natural (or heat) purge, which entails blasting onto a warm dish, then gently waving a flame over the residue until the solvent bubbles up and evaporates away; or vacuum purging, which uses a hand

pump (such as one used to bleed the brakes of a car) instead of heat to create a vacuum inside a container, forcing the butane to bubble out of the oil.

But there are some major downsides to making BHO, the first and foremost of which is safety. Would-be blasters, beware: Butane gas is *highly flammable*. When blasting or purging the butane, the air in the surrounding area becomes permeated by the gas, which is then all too easily ignited by something as trivial as the electrical signal of a text-message alert on a cell phone. Last October, a simple spark from a kitchen freezer ignited the butane in the air of a home in Oregon where people were making BHO, blowing the door clean off their refrigerator and straight through a wall. This past year, a number of explosions and serious injuries have been reported relating to butane extraction, including two people who were severely burned in their home outside Denver during a blasting accident, and another man in California who suffered burns over 90 percent of his body while attempting to make BHO in a motel room. For this reason, we at HIGH TIMES strongly recommend that readers leave this extremely volatile and dangerous procedure to the pros. And whatever you do, *never ever* attempt to make BHO indoors.

Another drawback is the quantity of herb needed. It takes up to a quarter ounce of kind bud to make just one gram of concentrate, which may leave some stoners asking themselves: Why waste all that primo bud to make such a small amount of BHO? The answer is potency. The strongest marijuana on record has around 23 percent THC, while BHOs average up to 70 percent or higher. Which basically means that just one "dab" of BHO can get the average smoker high for hours. Too big a dab, and even a seasoned stoner can become immobilized or even trip out from the level of cannabinoids—a state we've taken to calling getting "budder-faced." For this reason, we also recommend extreme caution when smoking BHO—especially for first-timers and those with low THC tolerance. If you're going to dab, dab responsibly. Remember—a little dab'll do ya!

Some naturalists have put forward the argument that butane extraction is unhealthy, because some slight remnant of the gas is bound to remain in the concentrate even after purging. The question is, is it enough to be a health risk?

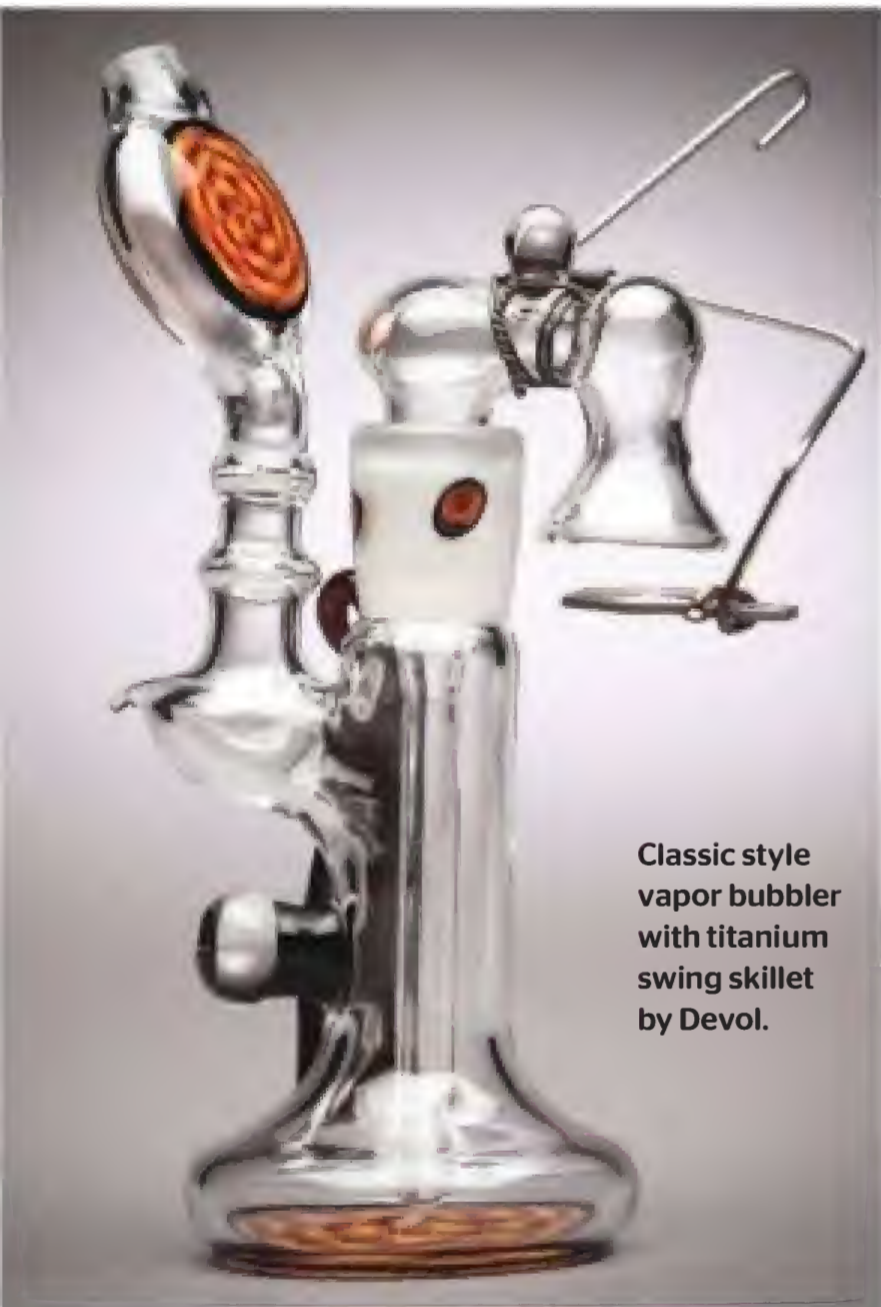
"The amount of butane you inhale

Right: Flower torch by Darby. Below: Pot leaf shaped trays and dabbers by Mr. Gray. Both by Hitman Glass.





when doing a hit of BHO is only a fraction of the amount you inhale when you light a bowl with a butane lighter,” says concentrate goo-ru Marc, who turned me on to my very first dab. “If you use lighters, you’re doing more damage to your body than doing an oil hit.” Plus the butane used for extraction is not the standard stuff you get at Rite-Aid to fill your Bic—it’s much purer. Much like the gasoline that we put in our cars, butane comes in various “octanes” or grades. The kind used in extraction is food-grade rather than commercial-grade—that is, quadruple- or quintuple-refined to remove nearly all of its impurities.



Classic style vapor bubbler with titanium swing skillet by Devol.

In response to this extract explosion, the smokeware industry has introduced a wide assortment of tools and toys designed especially for this new medium. Companies like Aqua Lab Technologies now feature a whole section of their website devoted to concentrate utensils, such as globes, slides, nails, dabbers and oil rigs (water pipes designed specifically for use with concentrates). Here’s how a rig works: Instead of a standard bowl, rigs have a nail—a small spike made of quartz or titanium. Using a high-powered lighter or small, hand-held blowtorch (such as a crème brûlée cooking torch), the nail is heated until it’s glowing red. A glass dome or globe is then placed over it to avoid burns and capture smoke, and a small dab (hence the term dabbing) of



John Hammond marvels at his huge glob.

### Concentrates Glossary

**Bell (aka Curve):** A bell-shaped glass headpiece that attaches to the stem of a standard water pipe used for smoking concentrates (see also Slide).

**BHO:** Butane hash oil, also referred to as butane honey oil. A concentrate made by shooting butane gas through cannabis, then “purging” out the butane.

**Blasting:** Making BHO (as in “he’s blasting some flowers tomorrow”).

**Borch:** A torch tube, or a combination bong and blowtorch.

**Bubble:** A type of hash that bubbles up when you smoke it.

**Budder:** An extract that has been whipped to a creamy, spreadable texture like butter; not to be confused with actual cannabis-infused butter, which is ingested rather than smoked.

**Budder-faced:** Getting really high on cannabis budder (i.e., “getting budder-faced”).

**Concentrate:** Any form of cannabinoid extracted from cannabis-plant material (e.g., hash, wax, tincture).

**Dab:** A hit of extract loaded onto a wand or pick to be smoked on a rig.

**Dabber:** A glass utensil used for smoking concentrates (see also wand).

**Dabbing:** Smoking a concentrate from a nail, swing or shovel.

**Dish:** A small, glass, ashtray-like container used to hold concentrates; usually including an indentation to rest a dabber.

**Dome:** The bowl-like collar/glass cap placed over the hot nail on an oil rig to help contain the smoke and prevent injury.

**Earl:** Slang for BHO (“oil”).

**Earwax (or just “wax”):** An extract with a sticky, pasty consistency resembling ear wax.

**Extraction:** Any method by which the THC and/or other cannabinoids are removed from the plant matter via a solvent.

**Goo:** Any sticky, oozy concentrate.

**Glob:** An especially large dab.

**Globe:** another term for dome.

**Hash oil:** A sticky, moist concentrate that has the consistency of oil.

**Honeybud:** Cannabis buds that have been infused with BHO.

**Hot-knifing:** A method of smoking concentrates that entails heating up the edge of a knife and then dabbing the concentrate onto it.

**Ice hash (a.k.a. “water hash”):** A concentrate made using ice-water extraction methods (see also bubble, melt).

**Iron:** A metal spike used to smoke concentrates (see also nail).

**ISO hash (a.k.a. “QWISO,” for “quick-wash ISO”):** A concentrate made by soaking cannabis in isopropyl alcohol as a solvent.

**John Hammond:** More slang for goo (named after the scientist from Jurassic Park and his amber fossil, which has a similar appearance).

**Kief:** A dry, solvent-less, powdered concentrate derived from sieving cannabis over a fine mesh.

**Melt:** A very pure hash that melts fully when smoked and leaves no residue.

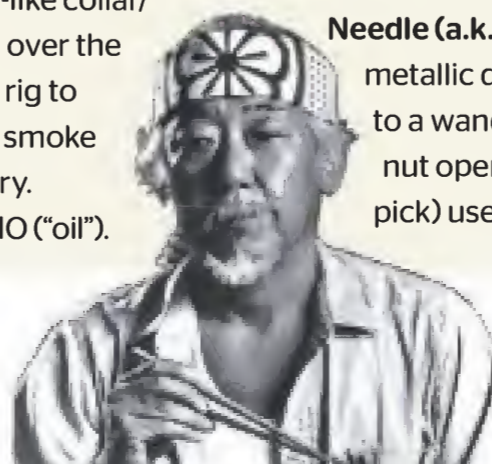
**Miyagi:** More slang for earwax (i.e., “wax on, wax off”).

**Nail:** A spike used in place of a bowl to smoke concentrates; usually made of glass, quartz or titanium (see iron).

**Needle (a.k.a. “pick”):** A metallic device similar to a wand (usually a nut opener or dental pick) used to scrape up



Boba Fett dome by Banjo.



concentrates and dab them onto a hot surface for smoking.

**Oil rig (or just “rig”):** A bong designed specifically to smoke concentrates by replacing the bowl with a nail and dome.

**Paddles:** Long, thin glass sticks with rounded edges used to smoke concentrates by heating up and pressing together.

**Purge:** The act of drawing out any solvents from your concentrate (usually by whipping with low heat or by vacuum leaching).

**Reclaim:** The excess oil that builds up inside a rig or shovel, which can be “reclaimed” by gently heating the glass with the torch and pouring it out.

**Shatter:** A form of BHO that shatters when you try to scrape it up from the dish.

**Shovel:** A hollow paddle that can be smoked from; a hybrid between a paddle and a bowl.

**Skillet:** A small metal plate used for dabbing.

**Slide:** A glass bowl that fits a standard water pipe that’s specifically designed for smoking concentrates.

**Solvent:** A medium used to extract cannabinoids from plant matter (e.g., butane, ethanol, alcohol, oxygen).

**Stab:** A hit from a hot knife (i.e., “Give me a stab of that earwax dude!”).

**Swing:** A small metallic plate clipped to a bong or oil rig and used to smoke concentrates.

**Tincture:** An ingestible extraction made by soaking plant matter in an edible solvent such as agave, drinking alcohol or vegetable glycerin.

**Torch:** A small blowtorch (usually a handheld crème brûlée torch or propane canister) used to heat a nail or skillet for smoking concentrates.

**Torching:** Smoking concentrates using a torch.

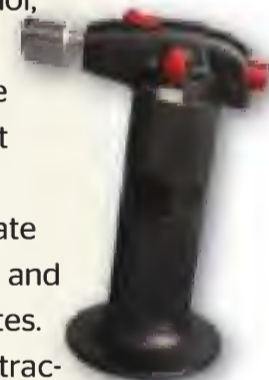
**Tube:** A rig or bong.

**Wand (a.k.a. “dropper,” “dabber”):** A long glass tool used to scrape up and apply concentrates to a heated surface for smoking.

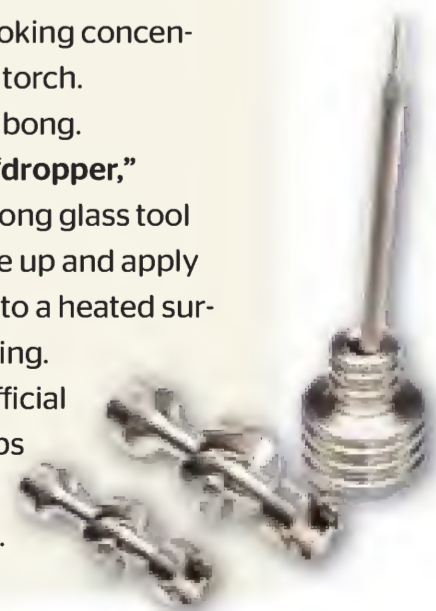
**7:10:** The unofficial time to do dabs (“OIL” spelled upside down).



Reticello-worked style concentrate dish by Samson.



Typical creme brûlée torch.



Titanium nails and needle with stand by Highly Educated Titanium.



concentrate is touched to the head of the nail using a dabber, generally a glass or metal wand. As soon as the concentrate begins to dissolve, the user draws in the smoke from the rig's mouthpiece in exactly the same way they would a bong. A brief coughing fit later, and abracadAB-ra—you're high!

One company on the cutting edge of this revolution is Hitman Glass, a budding smokeware business originally from Massachusetts (now based in California) that specializes in making cool custom rigs and accessories.

"There have been other companies who started making this stuff before us," admits Dougie Fresh, one of Hitman's owners. "Sovereignty, Toro, Headford, HMK and others ... all of these guys were making concentrate pieces before we were—we're just taking what they did to the next level."

For Dougie and his partner E-Roc, the next level involves some serious stoner engineering. Their most recent and imaginative innovation is something they call a "torch tube"—a glass rig with the torch mechanism actually built into it. A reservoir of liquid butane sits in the bottom of the piece and is released using a valve that, when lit, shoots a continuous tongue of flame directly onto the nail. Premiered at our 2011 Denver Medical Cup, "The Borch" (as many of us here at HT have affectionately nicknamed it) is without a doubt one of the coolest smoking devices ever created. The inventor of this technology is an ingenious glass-blower from Freeport, ME, named Steve

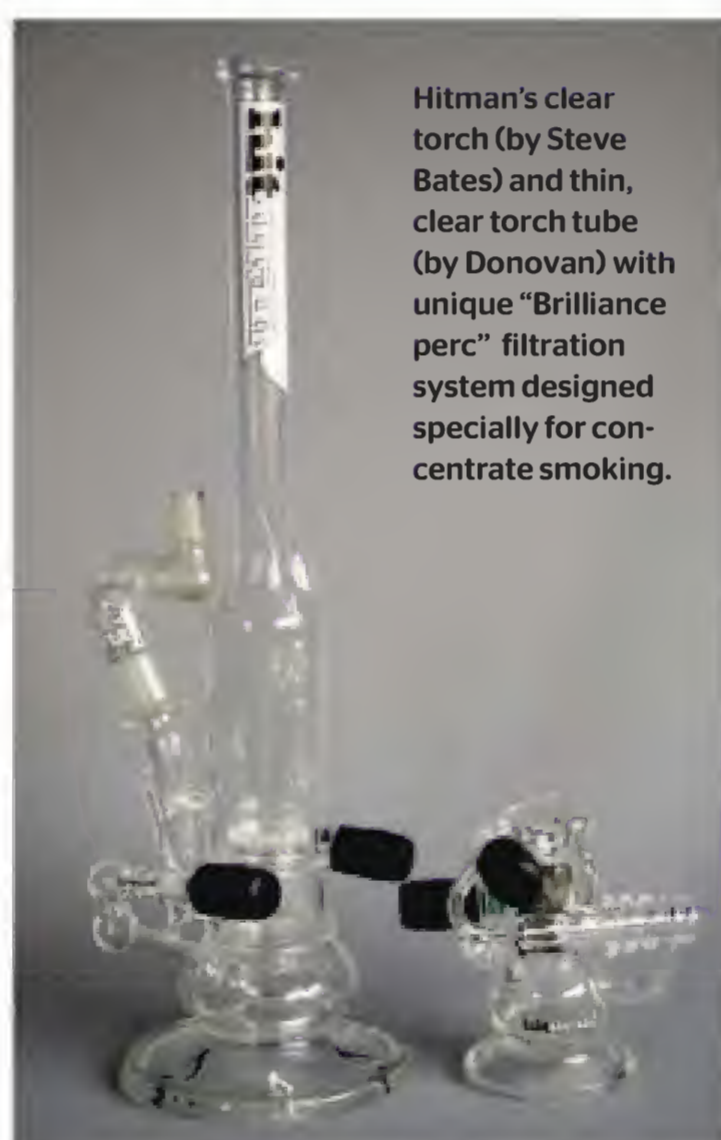
Bates (who, incidentally, is engaged to our reigning Miss HIGH TIMES 2011, Clazina).

Bates first got the idea for the Borch in the spring of 2011, after taking a class on scientific glass-blowing at Salem Community College in

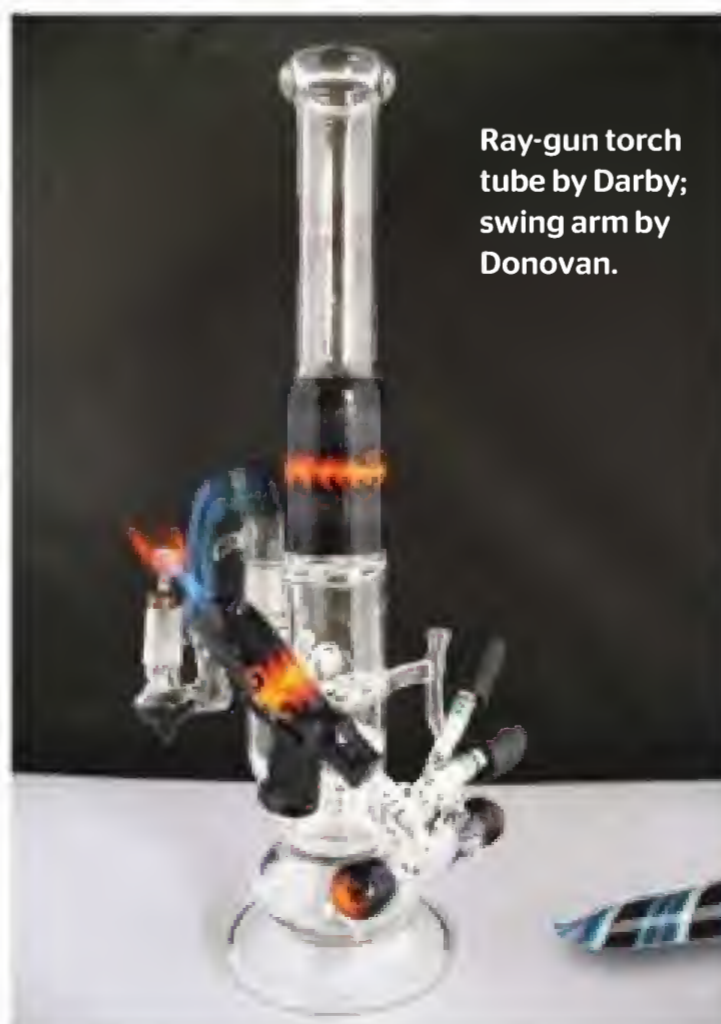
New Jersey. He was learning how to make laboratory equipment and started blowing glass Bunsen burners in his garage for fun. When he became aware of the growing popularity of "torch-ing" concentrates, he realized his idea would translate perfectly into the stoner realm. After several failed attempts, he perfected a butane valve-system design (initially using a mountain-bike shock pump as the valve) that was more user-friendly and easier to manufacture. When Bates met the Hitman guys at the Gathering of the Vibes a couple years



Borch creator Steve Bates with one of his early torches.



Hitman's clear torch (by Steve Bates) and thin, clear torch tube (by Donovan) with unique "Brilliance perc" filtration system designed specially for concentrate smoking.



Ray-gun torch tube by Darby; swing arm by Donovan.

back, a partnership was born. Now, Hitman is the exclusive producer of a whole line of torches and torch tubes based on Bates's initial concept. Top glass masters from across the country, such as Banjo, Darby, Casto, Mike Fro, Mr. Gray and others, blow individual sections of the pieces, which are then shipped to the company for assembly by Hitman's own Ari (a.k.a. "The Bluegrass Man").

These high-tech gadgets aren't cheap though: Most rigs start around \$400, and torch tubes range from around \$2,500 for clear pieces up to as high as \$6,000 for worked-over ones. Even glass torches with no pipe attached—in reality, purely vanity items—cost in the thousands.

Which, of course, is exactly what makes them so baller.

For the average stoner who can't "swing" that kind of cash, there are smaller, less expensive devices on the market that work well with concentrates, such as swings (small metal plates that are attached to the stem of a water pipe and heated, then "swung" under the bowl or dome, like the Vapor Swing), bells (glass heads that attach to standard water-pipe stems instead of a bowl), and hand-held vaporizers (such as the Vapor-Smoke and the Essential VAAAPP). Then again, you can always just "hot-hit" your oil by pressing together a couple of heated glass paddles or by dabbing your wax onto a good old-fashioned hookah charcoal and then sucking it up with a long, down-turned glass pipe.

Regardless of the exact methods chosen to make or smoke it, one thing is certain: Extracts are the hash of the future, and the revolution will be vaporized. So grab your wands, fire up your torches, and let's hit those rigs, America! It's 7:10, and Mr. Miyagi is waiting. ✨

*Editor's note: Just after completion of this article, Hitman Glass founder E-Roc was found murdered in a home outside Boston. E-Roc was a fun, smart, generous and kind spirit whose vision has helped change the world of weed forever. This article is dedicated to him and his legacy.*

Scan here to see video of the Borch in action!



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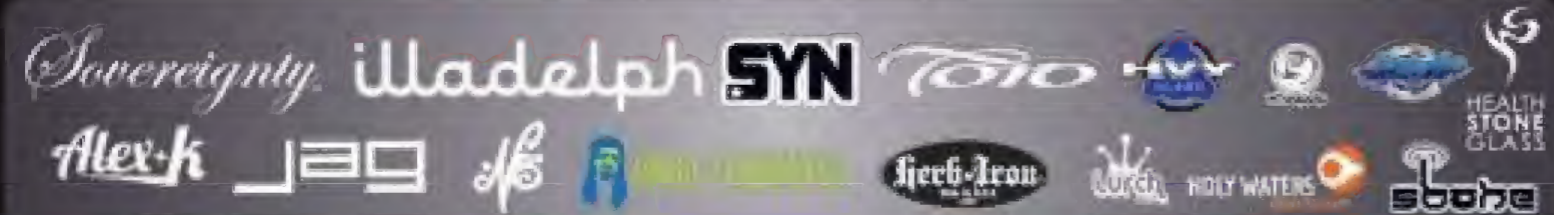
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Four generations of legal Colorado medical patients. Stacy Stetler, 29, with great-grandmother Mary Ann Montoya, 98, her father Michael Stetler, 56, and grandmother Lucy Teague, 76.

## Family Values

How does the saying go? “The family that grows together, grows together”—something like that. Need a poster image for medical marijuana? Look no further than the gardens of Michael Stetler. *Story & photos by Dan Skye*





**T**he truck turns off the paved highway onto a dirt road that snakes its way further up the mountainside. We're above Gardner, CO, which is situated at 7,000 feet in the Huerfano River Valley between the Wet Mountains and the Sangre de Cristos. Gardner is a town of approximately 600 rural Coloradoans who, historically, have had more than a passing acquaintance with high-altitude, outdoor gardens.

The road is rutted and our bodies are jounced around inside the truck as the 4-wheel drive drags us upward the last few hundred yards. Michael Stetler's gardens grow at 9,000 feet. It's been a warm autumn, but here in the mountains the danger of frost is drawing nearer. In truth, he'd rather wait on the plants for at least another week. "But I can't," he says. "One bad night will ruin a summer's worth of work."

He's constructed two gardens on his land, both rectangular—nothing more than plywood panels that have been loosely adjoined with a few screws. Atop the gardens, translucent ceiling panels protect plants from hail and heavy wind. The ramshackle enclosures are sturdy enough to withstand visits from deer and elk, but easily accessible for gardening. All that's required is a power screwdriver to remove one of the panels.

Robust specimens of New York City Diesel, Cherry, Purple, and Nehi Grape populate the gardens. The color of the plants is a gleaming green, far brighter than outdoor plants grown at sea level, a result of chilly nights. In a matter of minutes, the plants have been chopped down and hung for drying.

In a few days, Michael will return to finish the process of transforming the rugged, alpine pot plants into his personal medicine. He loves life in the mountains, but down in Pueblo, a city of about 100,000 in southern Colorado, the Stetler family business is in full swing.

Michael oversees Marisol Therapeutics here, a vertically integrated, family-run enterprise that encompasses a top-flight dispensary and a gymnasium-size greenhouse. (The Marisol greenhouse is featured in cultivation editor Nico Escondido's DVD *Grow Like A Pro*.) However, right now the focus of Marisol's workforce is its expansive outdoor garden just beyond the greenhouse.

Pueblo enjoys a high desert climate where the sun shines brightly 80 percent of the year. Several scientific studies cite Pueblo County as the best region in



Nehi is an Afghani  
× Northern Lights  
cross that flour-  
ishes at 9,000 feet.

*He remembers coming across cannabis tinctures that his great uncle, who died at the age of 92, stored to treat his arthritis. In fact, there is evidence that his family has been growing cannabis as far back as the 1850s.*

the state for solar energy businesses to locate. Marisol's outdoor garden is taking full advantage of the radiant autumn light as the plants live out their last week.

The superstar of the garden is Grape Nehi, a strain that Michael, 56, has been working with for over half of his life. It was 32 years ago that he encountered a particularly potent stash of Afghani,

which included a few wayward seeds. Because the common experience for those who smoked the weed was a profound, lethargic high, he opted to "soften the blow." He acquired some classic Northern Lights seeds and went about crossbreeding it with the Afghani. The result is a strain that effectively treats pain—especially headaches—and sells briskly at the Marisol dispensary.

Michael is hardly secretive about his history as a grower. Cannabis has been a part of his family experience for years. He remembers coming across cannabis tinctures that his great uncle, who died at the age of 92, stored to treat his arthritis. In fact, there is evidence that his family has been growing cannabis as far back as the 1850s. His ancestors who settled in the Pueblo area were of Mexican and Apache stock and had considerable experience with plant and herbal





*“I use a tractor, a disk plow to mix and invert the soil, and make rows for irrigation. The one difference, though, is that I plant my clones in the irrigation trough, not on the mound. Cannabis roots go deep and I want them to get as much water as possible in this hot sun.”*

medicine. They were small farmers who raised crops and livestock and lived simply with the cannabis plant long before it was made illegal. Michael’s cultivation practices reflect that simplicity.

“I do the same thing that farmers have been doing for years here,” he explains. “I use regular soil that our farmers use to grow vegetables and treat it with chicken manure and Black Gold cow manure. I use a tractor, a disk plow to mix and invert the soil, and make rows for irrigation. The one difference, though, is that I plant my clones in the irrigation trough, not on the mound. Cannabis roots go deep and I want them to get as much water as possible in this hot sun.”

There are 156 plants in this legal, outdoor garden, which nurtures the same strains as his mountain garden, plus others. Pueblo County has required



that Marisol install a high-security fence to enclose the garden and that cameras watch over the plants. Additionally, tarpaulin has been hung from the fence to keep the plants from public view. The county would prefer that Marisol grow even more plants to accommodate its many patients, but Michael’s bushy shrubs will produce enough medicine for everyone.

Beyond the rewards of providing top-grade cannabis to patients, Michael is proud that Marisol, in this depressed economy, has provided employment to 26 people. His daughter Stacy manages the dispensary and its staff of eight. A crew of 18 is responsible for bringing crops in. During these crucial days,

**From top: Michael weighs a monster plant immediately after harvest; a drying room refines the medicine; trimmers manicure buds into marketable produce.**

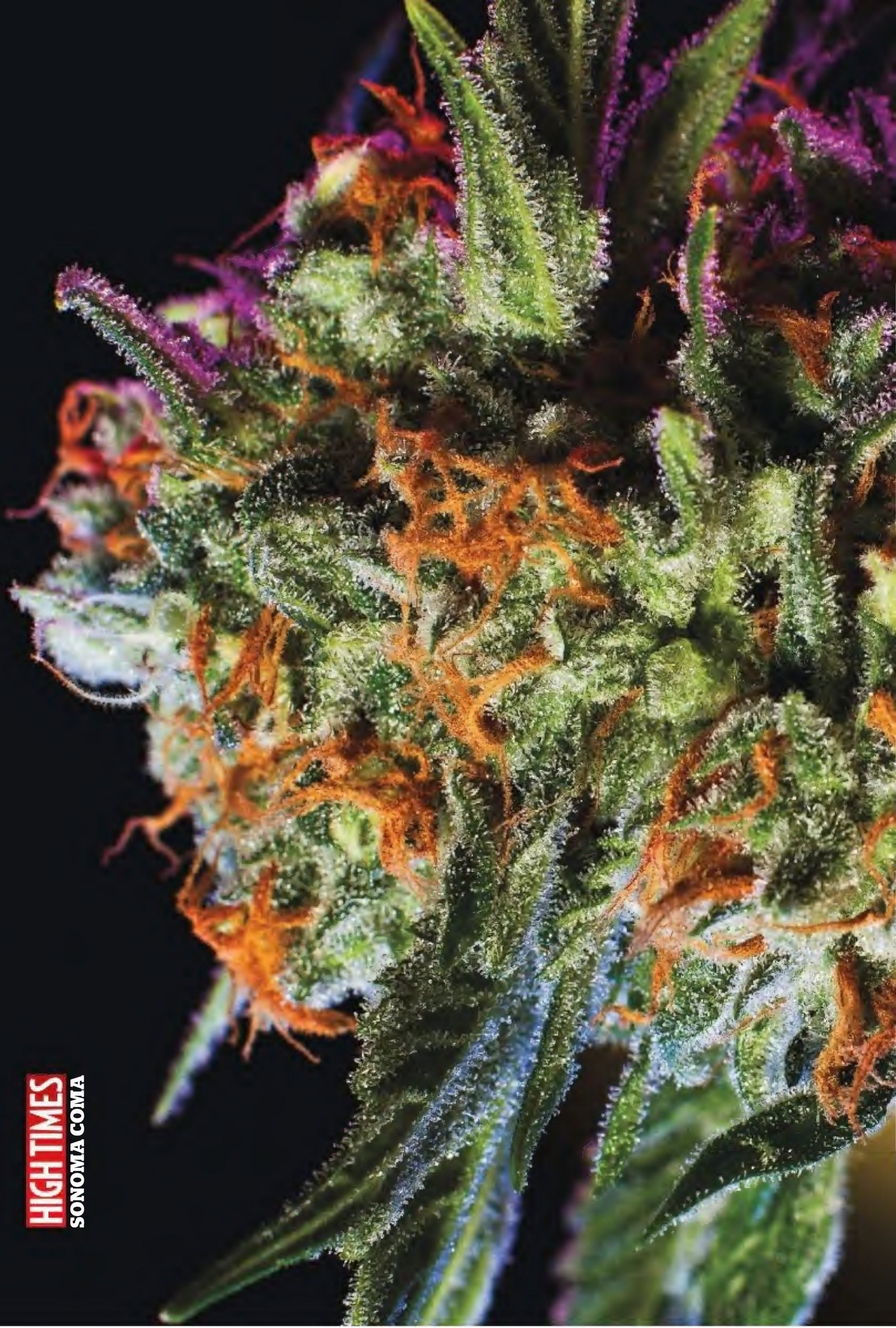


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a 24-hour work crew labors, partially due to the sheer poundage that needs to be processed and partially to ensure security. (In past years, thefts have been attempted, but Pueblo law enforcement seems to understand that these pot fields are legally operated. The most recent would-be thieves were caught hiding in a cabbage field and charged with trespassing, breaking and entering and burglary.)

Meticulous records are required in Colorado. Plants must be weighed immediately after harvest. Then, after they're dried and manicured, all parts of the plant must be labeled and accounted for in keeping with the regulations of the state medical marijuana industry. It's a laborious task, which all legal medical cannabis producers in Colorado must complete.

"It's probably more regulation than we need," Michael comments. "Anything that makes it more difficult for patients to get their medicine should be re-examined."

Marisol Therapeutics provides cannabis to approximately 600 patients and is recognized throughout the state as one of the model businesses of the industry. Among its members are Michael's 98-year-old grandmother, Mary Ann Montoya, and his mother Lucy Teague, 76. Mrs. Montoya uses cannabis tinctures to ease the symptoms of her glaucoma, while Mrs. Teague, who had been a third-stage, double myeloma cancer patient, found that through a regimen of ingesting cannabis tars, she was miraculously rendered cancer-free! Michael laughs that his involvement with marijuana in his younger days--when the concept of legal, medical cannabis had yet to be conceived--caused his mom and grandma much consternation and worry. But that was long ago.

On one of the last days before harvest, Michael brings his grandmother to the garden. It's a first-time experience for her. Her vision is diminished, but her encounters with each shaggy, fragrant plant are priceless. She smiles and smells, exclaiming over and over again: "How beautiful! I never knew!"

She moves on to the hanging room and later to the greenhouse. Her pride in her grandson's work is enormous.

As dusk sets in, the work continues. Michael admits that cannabis is on his mind constantly. There are hundreds

**From top: Stacy and great-grandmother Mary Ann admire budding greenhouse plants; This Cherry "tree" is close to being chopped down; Nehi x Diesel produces a purple-tinged plant.**



*"People think indoor pot is superior. They try to outdo Mother Nature.... Indoor growers try to mimic Mother Nature, instead of trying to go with her and accommodate her."*

of details to be addressed beyond the plants: overhead, payroll, taxes, county officials, attorneys, accountants. It's hard to maintain a "sense of purity," he says.

"I'd like things to be more simple because it's a simple plant," he says. "I love this plant and I love what it can do for people but, man! I don't see all of this bureaucracy for any other business."

Although the red tape may be frustrating, it's mitigated by the superior product he grows. Not surprisingly, his success as a greenhouse and outdoor cultivator has resulted in a steadfast bias against indoor growing.

"People think indoor pot is superior," he says. "They try to outdo Mother Nature. If cannabis were meant to be grown hydroponically, you'd have found pot growing in streams and lakes. Indoor growers try to mimic Mother Nature, instead of trying to go with Her and accommodate Her--so She can help grow Her plants. People say they produced this strain, or another one belongs to someone else. Remember, they're not our plants; they belong to the Creator." ✨

Visit [marisolmed.com](http://marisolmed.com).



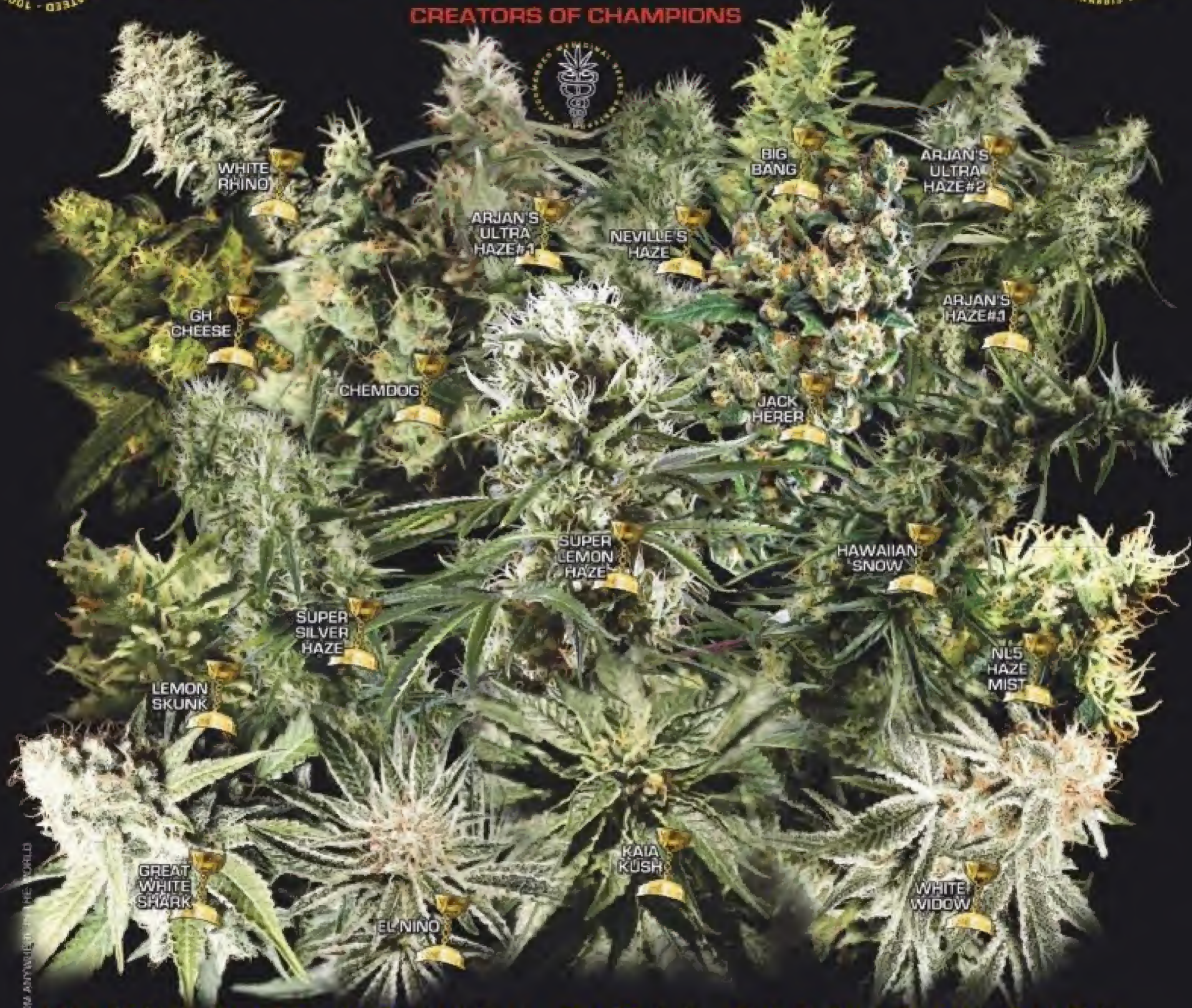
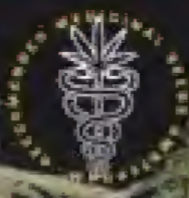


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# Nutrients 101

*A beginner's guide to growing strong, sexy plants.*

*By Mary Ought Six Photos by Nico Escandido*

**S**o you've set up your very first grow and you're ready to bring in your precious little girls and raise them into the sophisticated, cannabinoid-rich ladies they were bred to be. Here's your definitive 101 on getting them the nutrition they need for superior yields, whether you're growing with hydro, organic hydro or outdoors.

## Absorption & Circulation

➔ Nutrients are absorbed and transported throughout the plant first and foremost at the root level. This means taking good care with every transfer or transplant as well as having patience with clones, who are just learning to put down roots of their own. It also means making sure the medium you're using gives the roots plenty of room to breathe.

Hearty white, tangled roots may look crisp and sturdy, but it's actually the delicate, microscopic root hairs lining the tiniest to the thickest roots that bring in nutrient-rich water to be distributed up the stalk and down through each set of leaves. Some of that nutrient solution will evaporate from the leaves like a steamy sweat (much more pleasantly pungent than our own), which helps the plant to keep cool and purge waste. Any nutrient solution that isn't absorbed for use in beefing up plant cells or perspired through the outer membrane carries starches and electrical charges back to the roots for renewed energy.

## H2Know

➔ Since nutrients are the water-soluble form of important elements like nitrogen, phosphorus, potassium, sulfur and calcium (as well as the many helpful trace elements like magnesium and chlorine), the quality of your water supply makes a big difference.

To start with one basic difference, there is hard water and soft water; the amount of calcium and magnesium already present in your water determines just how "hard" it is. The simplest and most accurate way to determine the mineral content in your water is

with a meter that measures pH and ppm.

All nutrients are salts, and just as with humans, the more salty stuff that plants consume, the more water they crave. When salts excessively build up in the grow medium, they begin sapping water from the plants' roots. The harder the roots have to work for nourishment, the more energy the plants expend on trying to get enough to drink rather than focusing their energy on new growth.

To make matters worse, even though the roots are working overtime to eat, the plants still may not be getting the nutrition they need. When salts build up within the root zone, it creates a condition called "nutrient lockout," which prevents nutrients from reaching the roots for uptake. This will lead to undernourished and sick-looking plants.

New growers can easily make the mistake of adding more nutrients to treat a deficiency, but this will only exacerbate the problem. To treat the buildup successfully, a complete medium flush with fresh water is needed (maybe twice). Using softer mediums such as peat and coco mixes will give the roots an added layer of protection or buffering from the buildup of salts and is often recommended for beginners.

Remember, never let your water evaporate or get too low. This is another way for nutrients to lose their nutritional value and become poisonous. It's an excellent idea when changing out reservoirs to feed pure water to your gardens for at least a day before adding the new cycle of nutes.

## Checking Nutrient Levels

➔ Reading nutrient levels isn't rocket science; it's really just



a matter of simple math. But it is elemental, in every sense of the word.

Parts per million (ppm) is the standard unit of measurement used to determine how many parts of a given diluted substance are contained in the whole. For our purposes here, ppm can be used to measure nutrient levels in water. However, keep in mind that when testing for ppm, there's no way to tell which specific elements are at which levels; it's simply an overall measurement of total dissolved solids (TDS), or those parts of the nutrient solution that are not water. Some salts can build up and others deplete without changing the reading. This is why changing out reservoirs with fresh water and new nutrient solution is important—and why checking your pH levels can save a garden. Always keep the pH between 6 and 7, but as close to 6.5 as you can manage.

Another good rule is to always follow the dosage recommendations on your nutrients' labels. Never exceed that recommended level, as overfeeding your plants will not boost their output—in fact, it can seriously lessen it. Plants take only what they need for proper nutrition, and the rest stays behind in the medium. Those unused quantities are what cause toxic buildups and nutrient lockout. In fact, many advanced growers feed their plants half the recommended dosage and will adjust it to the recommended level only during flowering.

## Why Pot Plants Crave What They Do

➔ Nutrients are the chemical building blocks that create healthy structures and boost the end result by leaps and bounds.

During the vegetative phase, the nutrient that cannabis craves most is nitrogen. This amazing macronutrient is a big factor in determining just how robust your plants will be, beefing up their leaf and stem sizes to support mighty colas. A good grow-stage fertilizer will have all the nitrogen your plants are likely to need; however, nitrogen isn't the kind of element that hangs around long, so it's again imperative that you follow

the instructions.

During the flowering phase, your plants' desires turn from nitrogen to phosphorus and potassium. They'll still need nitrogen, but in much smaller amounts. When you switch over to flowering, change the nutes to a bloom-stage fertilizer. You can also add a micronutrient-rich supplemental booster for heightened yields, richer aromas, and extra protection against pests and disease.

Ten to 14 days before harvesting your indoor grow, you must completely flush your plants using only clean, balanced water. Nutrients will help to improve the flavor of plants, but not if they're still present when it's time to consume them. Poorly flushed plants do not

burn well and always have a bad flavor.

## Hydrated Hydroponics

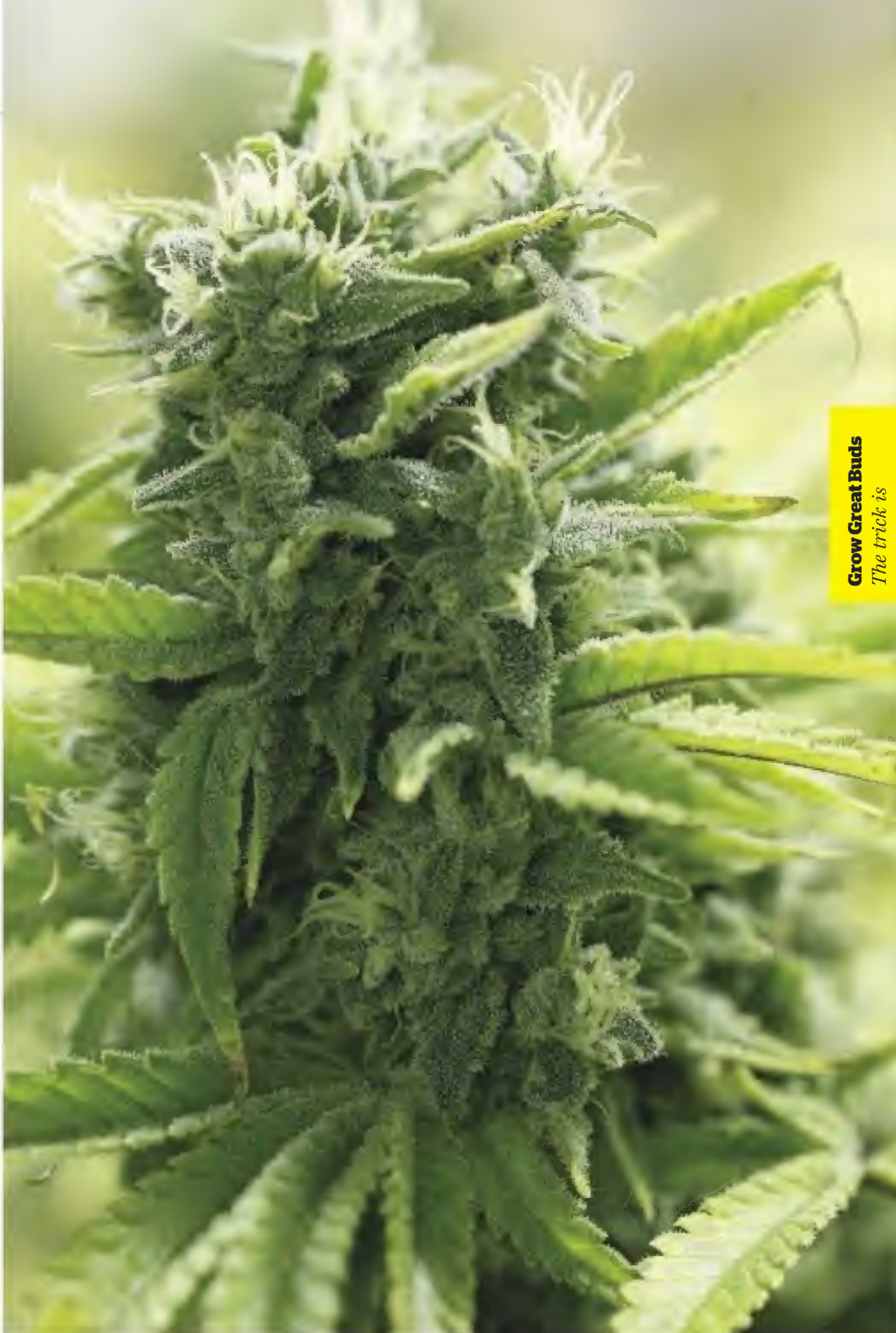
➔ These days, hydroponics are a popular method for beginning growers and pros alike. It's not that growing with hydro is easy; monitoring and maintaining a hydroponic system can actually be a lot of work. But it's not impossibly difficult to do, either, and the control you gain over your plants' environment and inputs—i.e., exactly what they receive in the way of light, air quality and nutrients—puts this method at the top of the charts.

Soilless mixes give you the

best control over nutrient intake. As much as water is crucial to a plant's health, so is air. Oxygen, carbon and hydrogen are the nutrients delivered this way—after all, roots have to breathe! Rockwool is your best bet for clones. Then, once they're ready for their big-girl pots, coco fiber, puffed clay, peat moss and perlite are popular choices for a soilless mix. Ask around discreetly at your local grow shop or do some research online to see which indoor mediums work best for your area's particular climate.

## Price Check

➔ When buying nutrients, be sure to check the bottle to see that all of the ingredients are



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listed along with their quantities. Also, don't scrimp—although paying more doesn't always guarantee the highest quality, when it comes to the really well-known nutrient companies (i.e., the ones who claim their solutions work the best and thus charge premium prices), it generally does. That's because minerals that are most soluble and have the best chelating elements cost more money to test and produce.

Metal ions like copper, zinc, manganese and iron are important for your plants' growth, but

**TIP:** In an outdoor grow, burrowing animals can gnaw on stems and roots, which will impair or kill the flow of nutrients in your plants. The best way to prevent this is to build chicken-wire barriers into the ground and under the garden before planting.

in their atomic form, these nutrients are difficult to absorb and will cause toxic buildups or nutritional shortages. Chelation is the awesome science that keeps metals flowing throughout your plants for delivery to all areas. At the same time, though, not all chelates are

created equal. The term derives from the Greek word for claw, which is exactly how it works with these minerals: A chelate is a metal ion wrapped in the claws of an organic molecule. The extra cover lets the ions navigate their

way through the electrically charged roots, stems and leaves of the plant, though if the bond is weak or the pH isn't kept at proper levels, the chelate becomes ineffective. That's why it's important to use high-quality fertilizers with the best chelating agents.

## Organic Grow Ops = the Best Medicine

→ Growing organically is always the best way to produce top-notch medical-grade marijuana. Many patients being treated for serious conditions like cancer or Crohn's disease are sensitive to any leftover chemicals from non-organic fertilizers (to say nothing of the fact that organic

weed tends to taste sweeter and burn more evenly).

Indoor organic hydro grows are set up similarly to their counterparts using synthetic chemicals, but you'll need some extra gear like an aquarium bio-filter (which you can get on the cheap at any pet store) and wider feeding tubes to avoid clogs, since organic nutrients are thick, dark and goopy (and, if you're a plant, delicious).

## Outdoor Organics

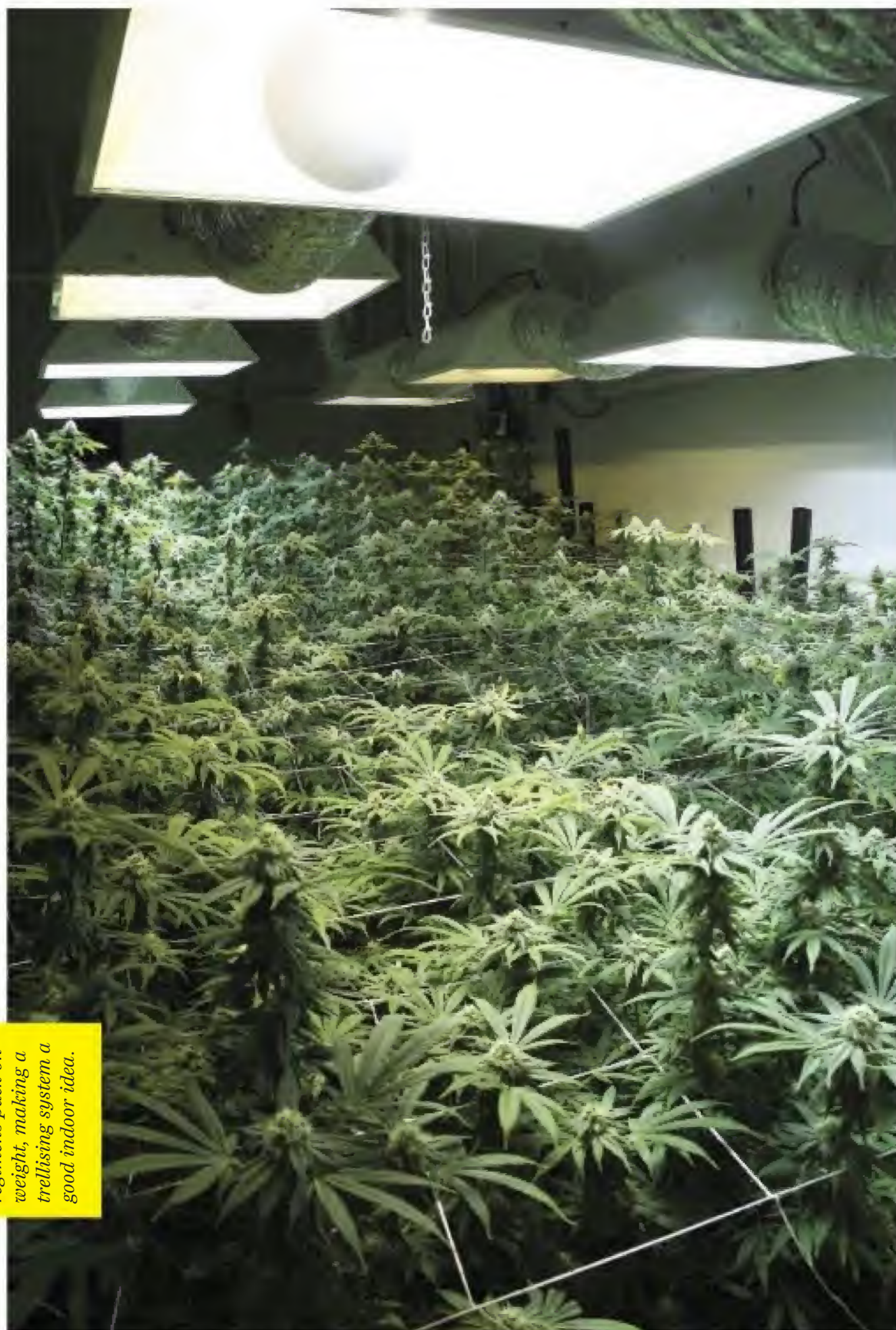
→ If you have a clandestine spot available for an outdoor garden, you have the perfect opportunity to grow some hearty, sky-scraping organic plants. Sunshine, plenty of water and the nutrients you use will determine the size of your harvest party. Raised beds of steamy organic soil or individual dugouts on a south-facing slope are both excellent setups. Be sure you know how the sunlight falls and if you're in the path of roving helicopters before going in.

Developing nutrient-rich, breathable soil (i.e., compost) is your first step. Coco fiber or peat mix blended with perlite, Epsom salts, dolomite lime, liquid kelp, worm castings and manure (except cow manure, which potentially harbors mad-cow disease) create a beautiful breeding ground for helpful bacteria and microorganisms. There are many compost recipes available online, but for the beginner, buying ready-made compost is the safest bet. Compost rich in liquid kelp will boost growth during the vegetative stage; then add bat guano for a potassium and phosphorus boost during flowering.

## Tea Time

→ Organic compost tea can be fed to your plants as often as you water them all the way through to harvest—it's pretty tough for the girls to OD on a tea's rich goodness. The right tea mix not only provides your plants with the necessary nutrition, but it also fights off insects, disease and fungus.

The initial tea can be made from the compost medium you've started with. Soak the medium for



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two days before putting it in the ground, and the water runoff will be your first batch of beneficial bacterial broth.

Begin with a 5-gallon bucket of clean water that's been oxygenated and then allowed to sit several times over the course of two to three hours. (This will allow chlorine and other impurities to rise up and evaporate.) Next, fill a bit more than the foot of a nylon stocking with your choice of organic ingredients and steep it in the oxygenated water for two days; you'll keep your "teabag" submerged, stirring occasionally to keep oxygen supplied to the solution. After the final stir, remove the stocking and let the mix settle for an hour, then strain it through cheesecloth into a new, sterile bucket. The tea is best when consumed fresh by your plants, so get to using it right away. You can also use it immediately as a foliar spray.

### Tea-Leaf Divining

→ Learning to identify plant deficiencies and overloads

can be the salvation of your grow op. An overdose of salty nutrients will cause leaves to yellow, spot, curl and burn; then it's time to flush! Undernourished plants, on the other hand, will have dark, velvety leaves that droop and tear easily.

Plants don't like surprises, including nutrient deficiencies, overindulgences or any other types of imbalance. Any and all of these factors can send a flourishing plant straight into stress mode. But if this happens, keep cool: Check the levels and make some adjustments. Start fresh with new water. And educate yourself—any good book on horticulture, botany or gardening will usually provide detailed drawings and instructions on how to read plant leaves and learn what they're trying to tell you.

### Safety First

→ Grow shops are often a treasure trove of information pertinent to your local conditions (because even if you're growing indoors, the outdoor



**Necessary Gear**  
Large reservoirs, pumps and hoses are needed equipment for nutrient programs.

### Moment of Zen

→ There are plenty of well-lauded techniques for growing pot, but a lot of them aren't for beginners. It's important to keep it simple and stick to the

basics if you're just starting out; you'll learn all sorts of tips and tricks along the way for boosting hydro and outdoor setups. So enjoy your first few test gardens, always remember to stay calm and focused, and try to invest in some prime how-to literature written by the greats of cannabis growing. Your green thumb will be glowing with finger hash before you know it. ✨

conditions will affect your setup). Among other things, they'll be able to tell you which nutrient blends work best for your area's seasonal changes and climate. Just be smart and don't get too specific about the nature of your grow. Also, take different routes and even drive different vehicles for multiple supply pickups, and always let common sense reign supreme.

basics if you're just starting out; you'll learn all sorts of tips and tricks along the way for boosting hydro and outdoor setups. So enjoy your first few test gardens, always remember to stay calm and focused, and try to invest in some prime how-to literature written by the greats of cannabis growing. Your green thumb will be glowing with finger hash before you know it. ✨

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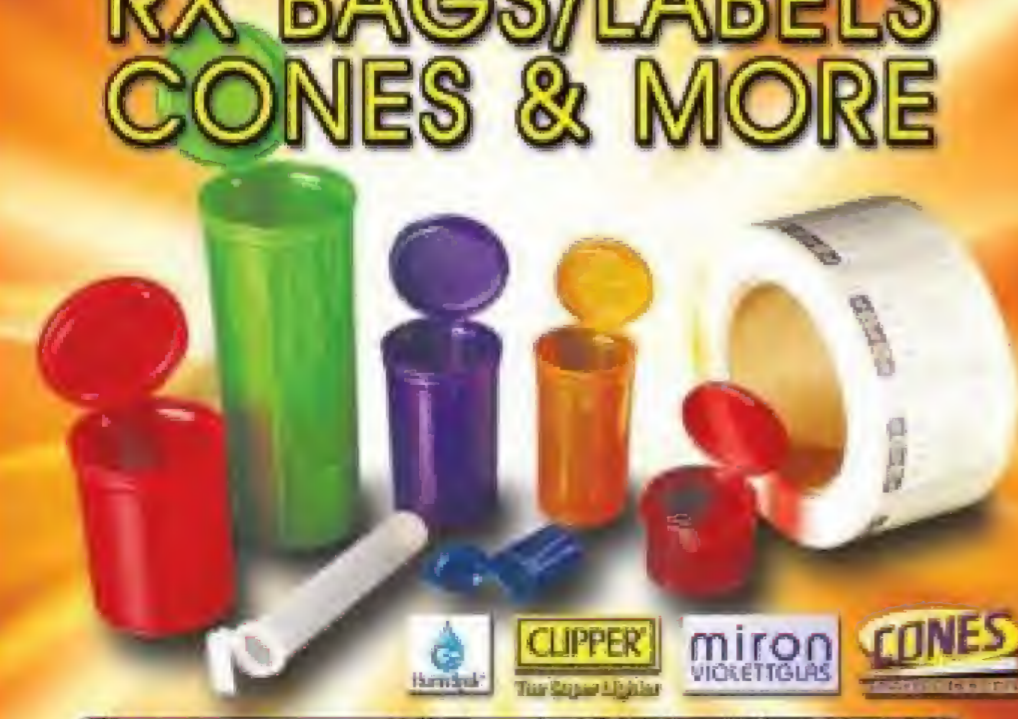
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# UV Light & Pot Potency

An examination of ultraviolet light and its effects on THC production.

*By Greg Green, author of The Cannabis Grow Bible. Photos by Nico Escondido*



THE USE OF ultraviolet (UV) bulbs for increasing potency in cannabis cultivation has often been discussed by experienced growers looking for ways to improve the medicinal

effects of their crops. Some growers have added a pet-store UV light designed for reptiles, claiming a boost in resin production as a result, while others have noticed nothing out of the ordinary except for a nasty bit of sunburn on their hands from tending to top canopies while the UV light was on. So what's the verdict on UV lights: Do they or don't they increase potency in cannabis?

Most of this interest started with a

scientific article titled "UV-B radiation effects on photosynthesis, growth and cannabinoid production of two *Cannabis sativa* chemotypes" (by J. Lydon, A.H. Teramura and C.B. Coffman) published back in 1987. The paper detailed how, under controlled conditions, UV light managed to raise the THC levels of plants subjected to it. The article was based on previous research that identified a possible role in UV protection by THC. However, we need to be cautious in interpreting these results. In fact, in the nearly 25 years since this paper was published, indoor growers have not incorporated an abundance of UV light into their setups. Why not?

To start, consider the greatest source

of UV light—the sun itself. Outdoor growers have no choice but to accept UV as part of the sun's electromagnetic spectrum. UV radiation comes in a few different "flavors," such as UV-A, UV-B and UV-C. However, when we talk about UV, nearly everyone is talking about UV-B. As we know from skin-cancer-related warnings, UV-B light is something we should mainly attempt to block out. While UV-B has some benefits, such as inducing more vitamin D production in various organisms, the negative impact from its destruction of cells almost always outweighs the pluses.

The intensity of natural UV-B light depends on weather and atmospheric conditions (especially the ozone layer's





**This grower is using various bulbs, including UVs, early in flowering to provide broader light spectrum.**

complex). Excited chlorophyll molecules need to process the energy so that high-energy electrons can be passed on to the electron acceptor. The energy is used as a form of biological current to power the plant's other needs, but too much light energy is like slapping extra weights onto an already overexerted weightlifter. As soon as that happens, the plant's rate of photosynthesis drops dramatically, and we end up instead with poorer yields, if not stunted growth, unless the problem is solved quickly. Technically, this situation is called photoinhibition, and although the plant has natural mechanisms to deal with it, it can become a big problem if those mechanisms are overwhelmed.

### Possible Pitfalls

**S**O WHAT DOES photoinhibition have to do with UV-B light? Understanding what photoinhibition is helps us to see what UV-B light problems are not. They are not photoinhibition-related: UV-B light problems have nothing to do with excess visible-light intensity. Instead, they have to do with the radiation properties associated with the specific type of electromagnetic wavelength that UV-B has.

UV-B presents its own particular set of problems because it causes chemical reactions—especially harmful organic ones. The type of damage that UV-B light can do to cells is irreversible, and that damage has a special name: It's called UV light stress, and in DNA it causes pyrimidine dimers (or molecular lesions) to form, altering the genetic structure and preventing further replication of the DNA and related proteins needed to maintain the cell. In short, UV-B light wreaks havoc on genes, and it doesn't discriminate between animal genes and plant genes.

But if this is the case, why aren't we all degrading rapidly like vampires every time the sun comes up? The answer is that we would be if it weren't for the ozone layer that filters out these harmful rays. Still, some rays do get through, so organisms have to find a way to deal with them. Humans have a layer of skin that naturally acts to protect our more vulnerable inner organs. Plants have another

way to deal with it: They use non-photosynthetic pigments called anthocyanins and flavones. Anthocyanin-type pigments are involved in screening out UV-B rays; they are short-day responsive (i.e., they react to changes in the photoperiod) and also cues for pollination. The fact that they reflect UV-B rays is also exploited by insects, which have evolved to see flower colors as they would appear under UV

**UV-B presents its own particular set of problems because it causes chemical reactions – especially harmful organic ones.**



**This bud was flowered using UV bulbs in the last two weeks before harvest.**

light. So, technically, if we want to see the true face of cannabis—how those top colas or nice branches of bud want to really express themselves—UV light is the only way to do it.

### Human Selection

**C**ANNABIS IN GENERAL is quite a tough plant and can deal with a good deal of stress, but stress is what a grower wants to avoid because it generally doesn't optimize plant growth. For outdoor growers, there is little they can do in the way of dealing with UV-B light except to give thanks for the ozone layer. As for indoor growers, most of them don't know it, but they're dealing with UV-B as well: High-intensity discharge (HID) lights would be emitting quite a bit of UV-B radiation without their glass shields. So the glass arc tube

status) as well as distance to the sun. When it comes to cannabis and sunlight, however, most growers want more sunlight, not less—but, for the rare few, this doesn't always hold true. Cannabis, like most other plants, has a "Goldilocks zone" of happiness—not too cold, not too hot, but just right. Nearly all plants will suffer stress from receiving too much light, even if well watered. Quite simply, the plant cells can no longer handle the amount of photons they're receiving, and there is no way to simply reject the photon energy so easily.

Once light makes contact with photosystems PS I and PS II, the plant-cell chloroplasts must take that photon energy into the LHC (light-harvesting



surrounding that glowing plasma stream is a filter against UV-B. While the filter can block quite a lot, depending on the brand of light, some UV-B is likely to get through—and so, to a degree, indoor cannabis is also exposed to UV-B.

So would you get a nice tan tending to your crop if the arc tube wasn't there? Well, aside from the fact that the bulb wouldn't work, the answer is that you'd likely be too busy dealing with a severely damaged crop to worry about your tan. UV-B light is harmful—it literally destroys cells (which is what causes both suntans and sunburns). Plant cells aren't immune from the same destruction, so cannabis, like many other plants, has developed its own sunscreen. If it didn't, cannabis enthusiasts would be very disappointed, because  $\Delta^9$ -THC is likely part of this sunscreen.

$\Delta^9$ -THC doesn't appear to be a vital protein for the plant's survival, but its omission from cannabis does cause some problems—notably an increased susceptibility to herbivore predation, but also decreased protection against UV-B radiation. The fact that  $\Delta^9$ -THC serves

**If cannabis is producing THC to block UV-B, then won't adding more UV-B produce more THC?**

several functions can be a bit startling at first—almost as though one must logically puzzle it out to determine which of those functions is the “real” one. But many individual proteins serve multiple functions in nature. In fact, natural selection will favor the proteins that serve the most functions because it means the plant (in this case) can use its resources elsewhere, such as for reproduction, instead of having to whip up different proteins to handle each separate function.

In a way, this type of efficiency would be a reduction of plant complexity, but we observe this trend all throughout nature—for example, in things like the reduction of fused bone parts in the jaws of dogs, or how mammals have fewer bones in their skulls than lobe-finned fishes. It can simply confer a benefit to be economical. So I'd be perfectly happy to learn that  $\Delta^9$ -THC serves several functions. There's no mystery anymore, nothing to keep us awake at night: Part of the reason  $\Delta^9$ -THC is there is to keep out harmful UV-B rays. However—and this is a key point—the amount of  $\Delta^9$ -THC in cannabis plants

intended for recreational or medical use has been bred into them under domestication. In other words, nature, in terms of protection from UV-B light, has taken  $\Delta^9$ -THC only so far, but we humans have taken it much further.

In a way, then, we can see the logic at work here for the grower who recognizes a connection between UV-B light and  $\Delta^9$ -THC. If cannabis is producing  $\Delta^9$ -THC to block UV-B, then won't adding more UV-B produce more  $\Delta^9$ -THC? It's not a bad idea, but it does confuse the role that phenotypes play with respect to genetics. In general, as just stated, it isn't UV-B that's boosting  $\Delta^9$ -THC levels anymore—it's human growers through selective breeding.

### The Evolution of THC

**S**OME PEOPLE might still be wondering if there's a way to use UV-B to cause the plant genes to

**The question isn't just when to add UV, but also how much—if at all.**

respond and produce more  $\Delta^9$ -THC. It's an interesting proposition, and we do see lots of evidence for stress-induced responses, such as in the example of the body builder who gains muscle by lifting weights. Plus, the expressed phenotype can, and does, vary in different environments. We said earlier that stress is generally what a grower wants to avoid, but it's also true that some stress may optimize plant growth—for example, a fan can cause plants to grow thicker stems and branches to stabilize themselves against the wind. But if this is the case, then why shouldn't adding more UV-B light produce more  $\Delta^9$ -THC?

In reality, the wind from the fan is maximizing the optimal expression of the genes for thicker stems. That character trait is already in the genes; we're just





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There are already better ways available to us to increase potency.

finding a way to bring it out. But we will not expand a plant stem forever by stressing it with wind, just as we won't achieve exponential increases in potency by stressing plants with increasing levels of UV-B. Here we are flirting with "Lamarckian" thinking, and we would be totally wrong.

In the late 1700s, the naturalist Jean-Baptiste Lamarck proposed the theory that organisms could evolve through inheriting acquired characteristics (such as, for example, if an athlete runs all his life and then has children; according to Lamarck, his children would inherit an increased ability to run). But the basic notion behind this concept is terribly unscientific. What actually happens is that, in any large population, we should find variations, and some variations confer a selective advantage on the individuals who possess it, who then pass those selectively advantageous genes on to their offspring. Some of these offspring may have a lesser value for the desired trait than their parents did, some just as much, and occasionally some will have a greater (even much greater) value for it than their parents. It is those exceptional members of the population that we then use in breeding in order to select for the trait better than it was in the parents' generation (or the generations before them).

In short, it has nothing to do with the environment somehow developing better genes in the parents, and everything to do with variations being selected for in the parents' progeny. It's all about finding that special variant and selecting for it so that, in future populations, the variant is more abundant. That, in a nutshell, is Darwinian evolution, and it's also the model that breeders use instead of simply waiting for nature to select for a desired trait.

(Though here's a nice little touch: Jean-Baptiste Lamarck is also the person who formally classified *indica*, which he named *Cannabis indica Lam.* to distinguish it from *Cannabis sativa L.*, the species first classified by the Swedish botanist Carl Linnaeus. So although his controversial and mistaken view of evolution was eventually undermined by Charles Darwin's theory of natural selection, Lamarck got it right when it

came to spotting the morphological differences between *indica* and *sativa*.)

So to return to our central question: Can UV-B light be used to increase potency? Not really. The evolutionary history of cannabis involves the gradual accumulation of cannabinoid defense chemicals against UV-B, but we are looking at a process that took hundreds of thousands (if not millions) of years of evolution.

### More UV-B Considerations

**W**HAT UV-B DOES, first and foremost, is damage cells, and this will have an impact on your crop.

However, let's imagine a thought experiment in which we try to exploit the correlation between UV-B protection and increased  $\Delta^9$ -THC. Think about it this way: If we place a UV-B bulb on our crop, some plants will experience less damage than others. We'd expect those

**These plants are in week seven of flowering and are getting a mix of HPS and UV from the light spinners.**

plants that survived (assuming their distance to the UV-B bulb was the same) would have more  $\Delta^9$ -THC to protect them than the rest. So, selecting these specimens, we allow them to breed and then, in the next population, we repeat the process. We can even increase UV-B emissions in the hope of eventually breeding some kind of super-potency—sort of like how viruses evolve to defeat the latest vaccine. However, this kind of workload really isn't that simple, and there are already better ways to increase potency available to us.

And here's another problem: We're assuming that  $\Delta^9$ -THC is the only factor that protects the plants against UV-B light. But this isn't the case, since (as mentioned) there are other non-photosynthetic pigments that protect plants





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from UV-B as well. We may even find that we've been selecting for something else, and that the  $\Delta^9$ -THC levels are the same or less in our selection. So we need to make sure that  $\Delta^9$ -THC is actually increasing in our populations, but getting our variables narrowed down to  $\Delta^9$ -THC is an immense task in itself.



While there once was a time for experimenting with UV light, now is the time for experimenting with some serious HID's instead.

A final thing to consider is that small populations simply produce more deleterious homozygous recessive traits due to inbreeding. So, for this experiment to work, we need large populations to select from. If we don't have large populations, then we simply won't have the degree of variation we need to find those special members who have developed a slight degree of difference in the amount of  $\Delta^9$ -THC they produce to deal with the UV-B light. This process is accumulative, meaning it's slow and gradual, so making the right selection is absolutely

essential. And, as mentioned, in the end we are likely to find that it's far easier to boost  $\Delta^9$ -THC levels in a strain simply by breeding for increased  $\Delta^9$ -THC without the use of UV-B. This is by far the most logical route—and it's one that breeders have been taking all along.

So does all this mean an end to the hopes that UV-B can increase potency? And, if so, why do we have a 1987 scientific paper saying otherwise? Well, the paper itself was concerned with the discovery of  $\Delta^9$ -THC as a UV-B filter, and its authors did see a rise in the

amount of  $\Delta^9$ -THC that was developing under UV light. But HID lighting has come a long way since 1987—today's growers are blasting plants with grow bulbs optimized and in a wattage that produce some truly excellent results when it comes to  $\Delta^9$ -THC levels. It seems that while the paper showed one trend, growers noticed an even bigger one with improved HID engineering, which has easily surpassed anything that UV-B was doing and then some.

I think growers who have extensive experience with HID systems can always think about adding some UV lamps for fun, though they're reminded of the

The best use of UV-B light could be in selections for breeding.

dangers involved: that UV light does damage to plant tissue and can damage  $\Delta^9$ -THC as well. (After all,  $\Delta^9$ -THC is just a filter, and filters can fail.) UV light also

has the ability to change cannabinoid content. That's why new growers should concentrate on optimizing with HID bulbs first. If anything, the take-home message here is that, while there once was a time for experimenting with UV light, now is the time for experimenting with some serious HID's instead. ✨





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## THE HIGH TIMES INTERVIEW

# KEVIN MCKERNAN

By mapping the cannabis genome, Medicinal Genomics founder Kevin McKernan hopes to unlock the mysteries of marijuana DNA.

by CHRIS SIMUNEK

**T**HE BREEDING of cannabis for medicinal purposes has come a long way since California's Proposition 215 was passed in 1996. The above-ground status of growers, dispensaries and patients has enabled the sharing of testimonial evidence as to which strains work best for which ailments. With medical marijuana now a quasi-legal, multimillion-dollar industry in 16 states, scientists are looking forward to the day that a serious genetic study of this plant is finally allowed, including clinical studies of all its cannabinoids. Ironically, this longstanding prohibition on marijuana has made it difficult for scientists to gather the empirical data that might one day raise medical cannabis from the status of "folk medicine" and place it in the same approved realm as the myriad pharmaceutical drugs (many of them known to be far more dangerous than marijuana) consumed by millions of Americans every single day.

In this respect, Kevin McKernan is a visionary. His company, Medicinal Genomics, is headquartered in Marblehead, MA, and has a laboratory in Amsterdam where its researchers can freely and openly study the many unknowns of this plant, which has been used medicinally throughout the world since at least 2737 BCE (when the Chinese Emperor

Shen-Nung prescribed it for "beri-beri, constipation, 'female weakness,' gout, and rheumatism" according to the 1972 report by the US National Commission on Marihuana and Drug Abuse).

In August 2011, McKernan announced that his company had successfully mapped the genomes for both *Cannabis sativa* and *Cannabis indica*. Medicinal Genomics then made its work on *Cannabis sativa* public via Amazon's EC2, a cloud-computing service that gives free access to the scientific community. Medicinal Genomics intends to make its work on *Cannabis indica* publicly available later this year.

At just 38 years old, Kevin McKernan has already amassed an impressive résumé in the field of genetics. A graduate of Emory University, he worked on the Human Genome Project from 1996 to 2000, running a research-and-development group at the Massachusetts Institute of Technology's Whitehead Institute that programmed and designed liquid-handling robotics and engineered a new DNA purification chemistry that was easier for the robots to manage. In 2000, he started a company called Agencourt Bioscience that sold its DNA purification technology to the scientific community and also developed a method for sequencing DNA that made the process 100,000 times faster than was previously available. After selling Agencourt to Life Technologies and managing its DNA-sequencing R&D for five years, McKernan turned his eye and considerable resources to the cannabis plant.



**After a career spent squarely in the scientific mainstream, what made you want to study cannabis?**

A lot of my friends either had friends with cancer or had cancer themselves and were asking us about how these sequencers were being used in cancer. We were working at the time with a lot of oncologists. If you sequence a tumor's DNA and sequence the patient's DNA, usually you find these differences in the tumor that weren't in the people's DNA, and a hopeful few of those become druggable targets. So I got involved and my friends were asking: "What's going on with medical marijuana?" We know cancer patients are using this, and that's when I started looking at it—and

the more I dug, the more and more I thought there are myriad uses for this plant. And that it's a real crime that they kept it illegal, for patient access at least.

And so, this summer, I decided to go and sequence the genome, because it looked as if the components of the plant that are medicinal aren't just about THC. I mean, THC seems to do wonders for tumors and for pain, but there are another 84 cannabinoids in the plant. THC synthase and CBD synthase are the genes in the genome that code for an enzyme that helps fold these hydrocarbons into cannabinoids. And those two have been known for a while, the sequence has been known—the Japanese, I think, actually weeded those out in

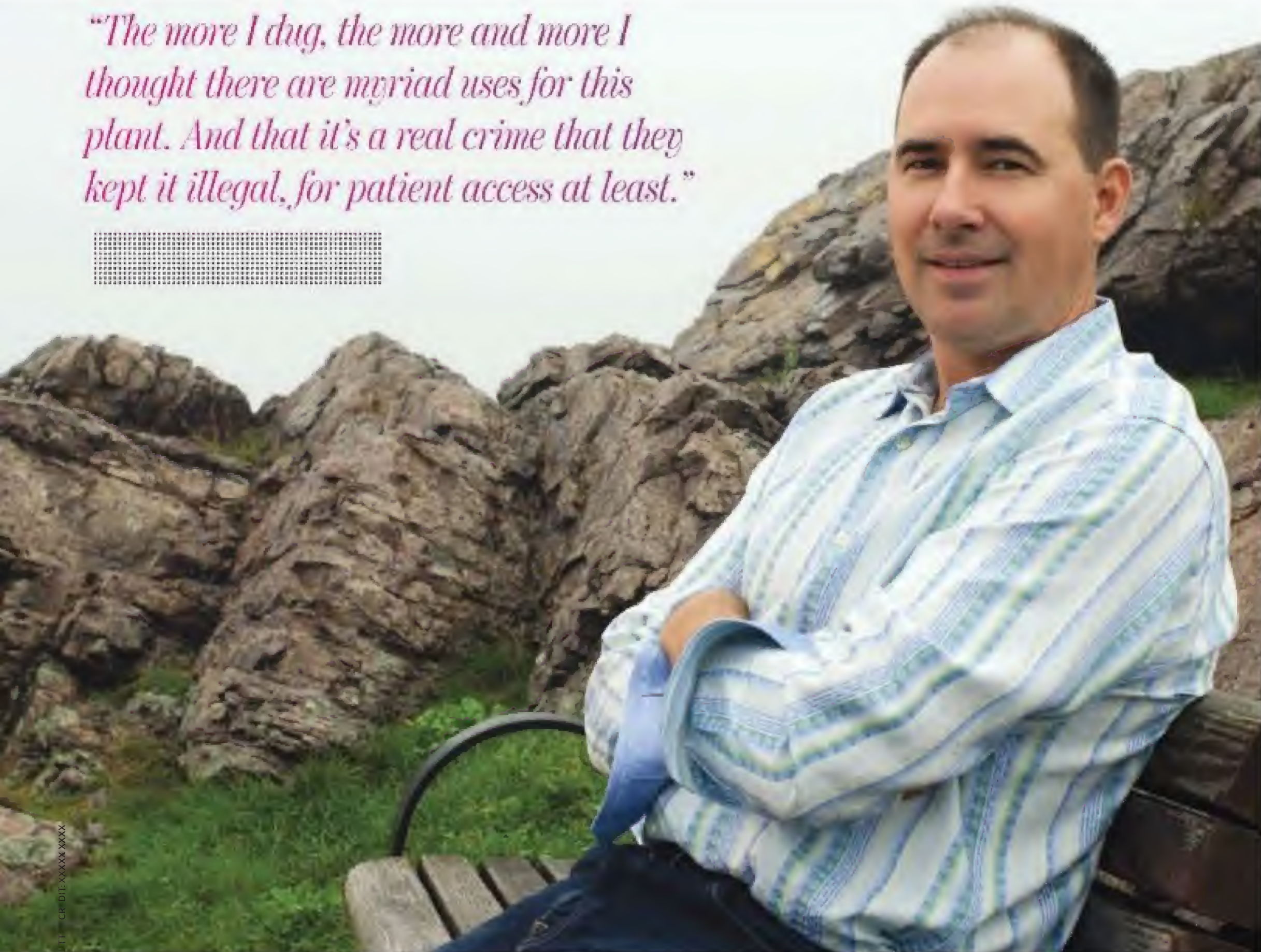
2004. But what governs the other 83 cannabinoids and the hundreds of terpenes in the plant are still a mystery. Nobody knows which genes are governing that, so we figured if we sequenced the genome, we could probably find those genes. And some of them, we suspect, could get resurrected—because when the federal government prohibited cannabis, everybody started breeding for higher and higher concentrations of THC.

**Was that necessarily at the expense of other cannabinoids?**

I don't know that we have proof of that, but just having looked at this pathway, some of the precursors are the same for all the cannabinoids, so

these enzymes are in competition with the precursors—the fuel. So if one of the enzymes is hogging up all the activity, then there's not enough of those precursors to make the other cannabinoids. So I think that's going to be the case ... have fun proving it. But the challenge the [illicit] markets had [was that] all the penalties were based on weight, not weight adjusted with THC concentration. So, naturally, they bred this for higher and higher THC concentrations, and I think that's been at the cost of some of the other cannabinoids being sort of bred down to, not extinction levels, but perhaps some very, very basal levels of expression. We're hoping by sequencing the genome, we can start to find what those are and

*"The more I dug, the more and more I thought there are myriad uses for this plant. And that it's a real crime that they kept it illegal, for patient access at least."*





maybe help guide breeding some of that stuff back into the plant.

**In the articles that I read in preparation for this interview, a lot of scientific journals were making reference to cannabis's ability to shrink cancerous tumors, and they weren't using words like "allegedly" or "supposedly," they were just basically referring straight to it. Is it, at this point, an established medical fact—that cannabis has this property?**

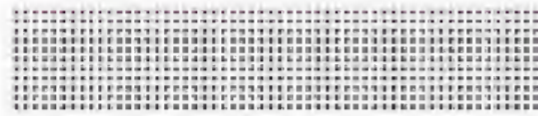
You know, it's interesting, because the NCI [National Cancer Institute] actually put that on their website, and somebody from the government made them take it down. They initially had a statement about palliative care, which is pain and anti-nausea, and they also put on their website in that same statement that there were potential anti-tumor effects. And like a month or two later, I think the DEA asked them to modify the language. But for right now, the anti-tumor effects have been shown in cell cultures and in rats—they're just now looking at this in clinical trials on people. So I think the jury is still out on whether they would call this clinically real.

But the reason I'm excited about it is because I've been involved in sequencing people's tumors to better pick drugs for them to take, and with some of these chemotherapeutic drugs, you're threading a needle between killing the patient and killing the tumor. And when you look at the therapeutic index of the cannabinoids, very few compounds have that forgiving of a therapeutic index.

**You mean it's a much healthier medicine to use?**

Yeah. If it shows any signs of shrinking tumors and it's that nontoxic, we have to basically go after it with guns blazing.

*"THC seems to do wonders for tumors and for pain, but there are another 84 cannabinoids in the plant."*



**And so, medicinally, what will be the benefits of having the cannabis genome decoded?**

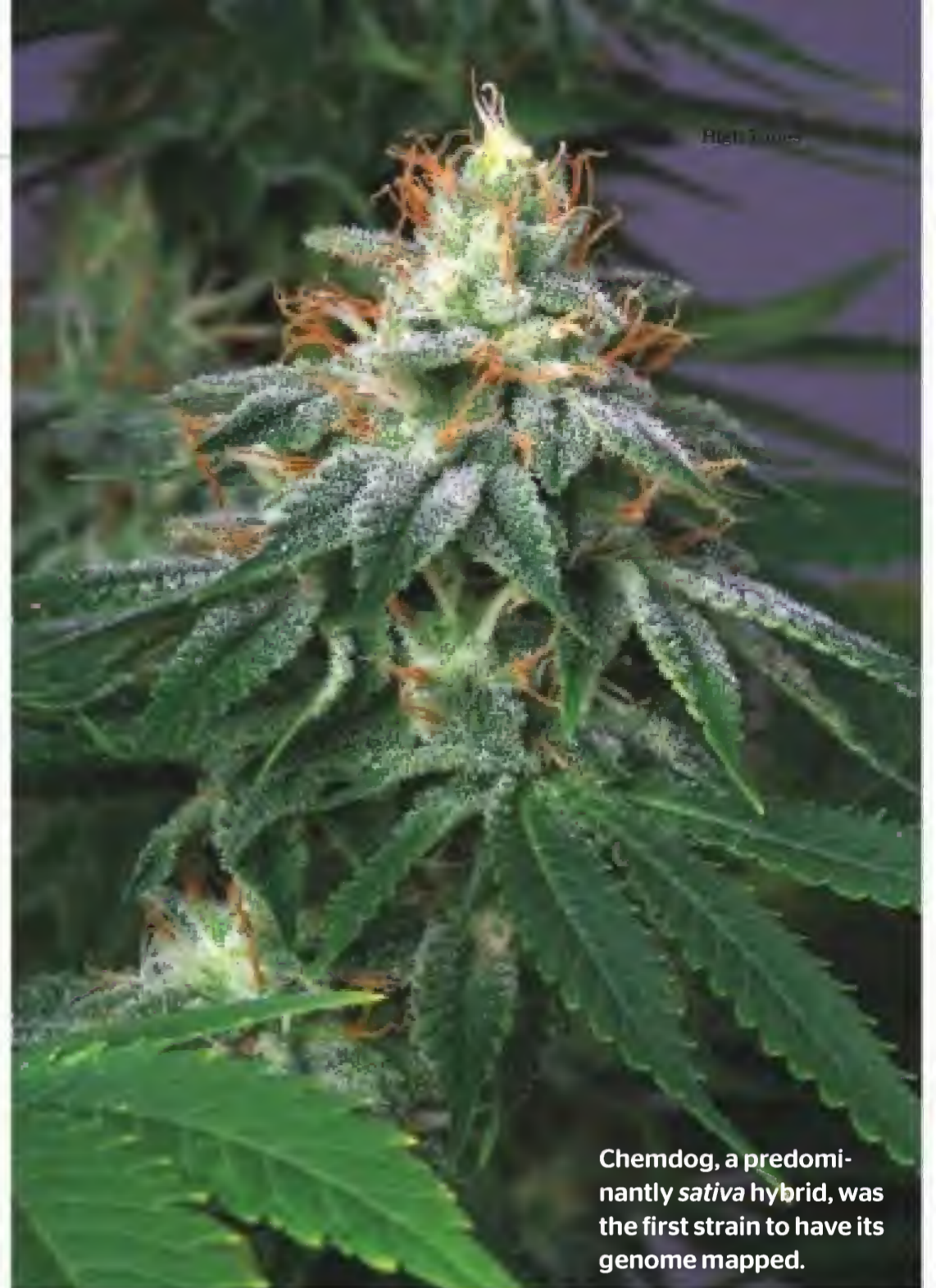
With THC and CBD, there are already pharmaceutical companies pursuing those, and I'm sure those are going to do well. But the other



LA Confidential from DNA Genetics is a triple back-crossed indica.

80-some cannabinoids, we're hoping we will find the genes that encode those, and then we can help people up-regulate those by breeding. A lot of hemp plants that have not been bred for THC have high CBD expression. And we're hoping we'll be able to match mother and father much more accurately to bring out some of these other genes.

And I'm still a proponent of what GW Pharmaceuticals has been doing in this space, because they've gone with the plant extract, and I think that's probably the right bet today—this plant being so complicated that if you tried



Chemdog, a predominantly sativa hybrid, was the first strain to have its genome mapped.

pretty darn close, and that's a difficult thing to compete with.

**Once you discover these other cannabinoids, what's the process whereby you learn how they'll affect cancer and various other ailments?**

You would actually put them through a clinical trial. There's a handful of cell lines from the National Cancer Institute that are cells derived in Petri dishes of different tumors. They're not exactly what any given person's breast cancer is going to behave like, but they are models, and people start dosing those cells with these types of compounds to see what types of activity occurs. Do the cells die? Do they continue to grow? Do they grow faster, slower? Now, we're not set up to do that; we'd probably partner with somebody who's already set up to do that and actually take it to this next step of bringing it to clinical trials and taking a look at these things in people.

**You've mapped both an indica**

to synthesize all 85 of the cannabinoids and balance them in some cocktail ... I mean, it's cheap for pharmaceutical companies to make one or two compounds, but when you start getting into dozens, and the alternative is a plant, it doesn't make much sense to continue to synthesize dozens of these things.

**We have something that's already there.**

Yeah, exactly. [The companies] will always be questioning whether there will be a return if people can just resort to a plant. Even if it's not the perfect ratio, it's



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**and a *sativa*. I'm wondering which strains you chose, and why those particular strains?**

The two were Chemdog and LA Confidential. So Chemdog—I think it's a *sativa*-dominated hybrid—we took a look at it because it's a famous strain and there seems to be a lot of folklore as to what its actual history is.

**I doubt there are too many pure *indicas* or *sativas* on the recreational market.**

One of the reasons we went after LA Confidential is because we recognized what people were saying of Chemdog—that, hey, this thing seems to be a hybrid, which means it has two very different genomes in it. So we went back and spoke to Don at DNA Genetics about this problem, and he right away was like: "If you want something backcrossed to pure *indica*, your best bet is LA Confidential. It's pure *indica* and it's been triple backcrossed, and likely if you backcross a lot of these things any more than that, they start to show some really weird phenotypes. I don't know if you want to have an unstable plant." And the benefit with this is that they've done the triple backcross and the plant is stable—and, actually, I think it won a Cannabis Cup or two. So we figured that was a good candidate.

**Okay, and why did you put all of your findings on the Web for free?**

Well, one of them: We put the Chemdog's genome up because, after speaking to a lot of people in the field, we felt that we would be vilified if we came in here, did the sequencing and said we're gonna keep it all private. It just didn't feel like the right way to start things off, so we put one of them public. And the other reason for putting it public is that we figured that we could actually leverage some resourcing and get some other minds on this. The moment we put it public, there was another two or three dozen people looking at this data and responding as to what they were finding in it. And it's more data than a small company can possibly digest, so I didn't want it to be held up in some company's coffers for like another five years.

Now, we still have another genome that we sequenced that we haven't put public yet, but we'll be putting that one public once we've gotten our head around a few of these problems that we've been trying to solve ....

**This is the LA Confidential?**

Yeah—the LA Confidential is going to go up, hopefully, before the end of the year. And that one will probably have a link to it from an iPad app we're putting out. It won't actually fit on an iPad—it's too much data—but we can have an interface that can educate people about, you know, what does this stuff mean? We're trying to get the average person interested in this. We'll also have some links in there to some medicinal papers that we've read and some explanations of what these papers mean in laymen's terms. We're hoping to target anyone who's interested in genomics, cannabis or cancer. So it's a pretty broad spectrum of people, and it's meant to be more sort of a Wikipedia of information on what we've found with the plant. And our interest there is just to get it on a viral form of media that will get the word out as to what we're doing and explain to people why this is an important field and why people should care about genetics when thinking about cannabis.

**And, theoretically, someone could use your findings to make a plant with even more THC in it, right?**

They could. I'm somewhat skeptical: The last 30 years of hyper-breeding has probably pushed the plant to express as much of that as it can. But, I mean, I could be wrong—someone might be able to dial that in. My general sense is that if you try and crank the THC any higher, I don't know if the trichomes are going to remain stable.

**So people are looking at CBD and CBN for medical applications, but you'd have to argue that for certain ailments—for instance, PTSD—the psychotropic effect of THC is part of the plant's medicinal quality.** Without a doubt, without a doubt. Unfortunately, the US government doesn't like to admit that, but the pharmacology will tell you and advise you to have some THC present. Complete elimination is probably a bad plan.

**Do you think someone might eventually be able to use your findings to contest the US government's classification of marijuana as a Schedule 1 drug with absolutely no medicinal value?**

I hope so. I mean, part of our interest in putting [our findings] public was that it would make it so anyone in the world can research without having to get a license per se, and can answer certain questions without actually having to grow the plant. ✨



# Buddha Seeds

## White Dwarf

### Autoflowering

White Dwarf is an auto flowering variety with pervasive scent and sweet flavour which comes up from the crossing of two powerful cannabis indica.

White Dwarf blooms in 2 months after sowing regardless of photoperiod. Such thing makes it perfect for early crops.

Besides that, it is a small-sized discreet plant which can grow up away from the onlookers.

Its resistance and short cycle reduce the chances of having problems during its growth; this variety is a safe bet for beginners.

**HARVEST IN 65 DAYS**  
**5 Feminized Seeds 40€**



## Red Dwarf

### Autoflowering

From the auto flowering parental strain that led to White Dwarf, hybridized with an exceptional skunk type female, and crossed to maintain the auto-flowering pattern, is born Red Dwarf: a compact, female, auto-flowering, resinous plant with intense smell and extreme power.

The low branching and compact bud make it ideal for growing indoors and outdoors in reduced spaces.

**HARVEST IN 60 DAYS**  
**5 Feminized Seeds 30€**



## Deimos

### Autoflowering

Deimos is a hybrid which origins are mostly indica (Northern Lights), a work of selection of 7 generations in order to obtain the features of a Classic in an auto flowering plant.

Deimos is big sized plant, with good growth in width and high. The selection of the more branched specimens has prevailed, long lateral branches which yield buds as big as that of the central branch. This way productivity increases but the plant remains discreet in size, between 70 and 80 cm. Due to its nature Deimos becomes the perfect autoflowering plant for outdoors and indoors.

The power of Deimos turns more than one pale, it's a devastating plant, its taste is classic sweet and tangy, a perfect plant to relax, introspection, go to the movies, medicinal use, or just to knock down that friend, who's an "expert" on the issue.

**HARVEST IN 65 DAYS**  
**5 Feminized Seeds 40€**



## Quasar

### No Autoflowering

Quasar, which comes from a pure indica and a backcrossed sativa, unifies the best of both strains into a choice hybrid. Highly vigorous growth that reduces indoor cultivation timing; it also yields radiant outdoor plants. It has a powerful structure that easily stands the weight of several buds, hard and compact to the point they seem pressed.

Astonishing potency, strong effect with a hard disposition to euphoria without nervousness.

With Quasar a perfect balance between indica & sativa has been achieved, it will surely satisfy sybarites for its quality as well as commercial growers for its quantity.

**5 Feminized Seeds 45€**



## Syrup

### Autoflowering

Syrup is a hybrid obtained by crossing autoflowering varieties with the sweetest of indicas.

It has a fruity flavour with hints of ginger and elderberry, but its real beauty lies in its potency.

With dense and heavy smoke that you can almost chew, its effects are heavily narcotic and ideal for medicinal use.

Indoors it is an ideal plant for the sea of green technique; outdoors it is discreet enough to be ideal for gardens and balconies. In terms of taste it is a real delicacy and is quick enough for even the most impatient grower.

**HARVEST IN 57 DAYS**  
**5 Feminized Seeds 35€**



## Pulsar

### No Autoflowering

Pulsar is a non-autoflowering cross between Dutch and Central American sativas.

One of the most peculiar attributes is its high production and big sativas charge.

It has extremely vigorous growth and is tremendously expansive, so it is important to prune the tips of the plant if growing indoors, or to use the Screen of Green technique.

If growing outdoors we recommend that you plant it towards the end of the season to avoid it growing in a monstrous size!

Pulsar's genetics give it a musky smell and a spice-like flavour, while its haze background makes for an energizing, stimulating effect which will eventually leave you laughing uncontrollably.

It is not a plant as suitable for the novice growers and neither for inexperienced smokers.

Flowering: 75 days

**5 Feminized Seeds 45€**



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Red Dwarf  
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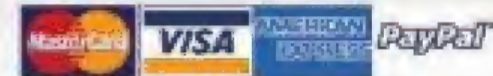
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# Expert Grow Advice

## Spider Mites, Beating the Heat, Auto-flowering Plants and Moving Your Grow.



Send your cannabis cultivation questions to [deardanko@hightimes.com](mailto:deardanko@hightimes.com)



SUBJECT: **Mite Mayhem Mania**

FROM: **Al Green**

🌿 I'm reaching out in the hopes of saving my girls from spider mites. I used an organic soap during vegetative growth when I noticed the little webs. It cleared up for a while, but now it's week seven and I'm starting to see little bitty webs on some of the buds. I ordered ladybugs today and would appreciate your advice on what else to do. I don't want to pull any of my ladies prematurely, so please help this loyal fan.

Dear Al,  
I never tire of answering this question because I am personally familiar with the "mite-mare" you're having. Spider mites are the single most dreaded plague among growers, and also the most common; for some reason, they seem to love to suck the juice out of cannabis leaves. The telltale sign of spider mites—little white or yellow dots on the surface of leaves—can cause quite a panic even

in a seasoned grower. That's because the mites spread so quickly and are so difficult to truly get rid of—even just a few days' inaction will lead to webbing and a full infestation.

You are wise to release ladybugs, but keep in mind that they will feast for a while and then try to migrate away before the job is finished. An organic soap is the perfect complement, and neem oil helps as well. Pull off any webs and be sure to hit the undersides of the leaves with your spray. Eternal vigilance is the only way to be sure that you are rid of these pests, so you'll need to check the undersides of your leaves constantly in order to avoid another infestation.

SUBJECT: **Storing Male Pollen**

FROM: **Processor of Truth**

🌿 How long is male pollen viable if it's stored in a cool, dry place away from the sunlight?

Dear POT,  
As long as your male pollen is kept cool, dry and completely airtight, it should last for at least a couple of months. However, pollen is always most viable in the very first week or so after harvesting it. If you really need to store it long-term, be sure to use a desiccant to absorb any excess moisture before placing your light-tight and sealed container in a cool, dark closet or cupboard (avoid either the



*Danko Tip:* Enriching your growroom air with CO<sub>2</sub> will increase your yields by 20 to 30 percent.

This extreme Super Snowdog closeup shows tremendous trichome production.



freezer or fridge due to the high humidity level). Keep in mind that the pollen's effectiveness will decrease over time, so your best bet is always to use fresh pollen in your breeding experiments. I have heard of breeders keeping pollen stored for over a year with little degradation, but like I said, it's always best to use it sooner rather than later.

SUBJECT: **Bud For Oil**

FROM: **Eric B.**

🌿 I'd like to start by thanking you and all the other people out there who advocate an end to the ridiculous prohibition of our beloved herb. Once I decided to devote myself to continuing education and research concerning the many benefits of the cannabis plant, your articles were a deep inspiration. Learning about cannabis

has been my passion ever since my first experience with the plant, when it became clear that the compounds in marijuana alleviated my depression, anxiety and lack of social confidence in a way that no other medicine ever has.

My question is: When you cure your buds and utilize the excess plant material to make a tincture or oil, can you spray that oil onto the buds as they cure? My theory is that it would make an already potent bud that much more powerful by reintroducing valuable cannabinoids. I've heard about smoking or cooking with both at the same time, but I have yet to hear about finishing a curing cycle by spraying the buds with hash oil. In practice, however, I turn to you for advice first—I don't want to ruin my buds, nor feel as though I'm ripping off my clients by adding weight if it serves little purpose. It seems like a

wonderful idea, and I think I could create some strong medicine, but I just want to check with the experts before I go through with it.

Dear Eric,

It's nice to hear your kind words of praise for what we do, and congrats on delving into the world of cannabis activism and cultivation. I truly believe that growing marijuana is a political act.

That being said, I don't recommend spraying any kind of cannabis tincture or oil onto the buds. These concentrates work wonderfully well on their own, but not when added back to the plant from which they came. I've tried buds that had hash oil added to them, and, while certainly potent, they didn't burn properly, nor was their flavor (or the smoking experience overall) enhanced by the process. It's best to keep buds as buds and concentrates as concentrates and choose between them based upon your needs; trying to use one to enhance the other just seems to defeat the purpose of both, in my opinion.

SUBJECT: **Shifting Schedules**

FROM: **Marcools**

🌿 Say you're midway through flowering and want to move your flowering schedule up two hours (from a 1 p.m. to 3 p.m. start) to make it more convenient for your daily routine. Would the plants notice the difference, or would they stress and create male pollen sacs? Thanks—you guys are awesome!

Dear Marcools,

As long as you give your plants their full 12 hours of darkness, you can make this shift without freaking them out. Simply delay the start of your light cycle by two hours and they will adjust to the change without any sort of stress. Be sure to give them 10 hours of light the first day (not 14) and they should be totally fine with the shift.

SUBJECT: **Think Thick**

FROM: **Kemo That Dude**

🌿 How do you grow plants that have nice sturdy bases and big fat buds?

Dear Kemo,

The answer to that question is a bit



*Danko Tip: Always let tap water sit out overnight in an open container to release chlorine into the air.*

complicated since so many factors come into play, but I'll give it a shot. In order for plants to have "nice sturdy bases," they must have plenty of light, food and water in the appropriate ratios. Keep a fan blowing on them as they vegetate in order to build up a stronger main stem, and use pruning and training techniques to bulk up growth.

Thicker stems will support bigger buds, and a well-developed root system is a must as well. Vegetate the plants for at least two weeks to build up roots that will feed the growing shoots. Keep all grow lighting as close as you can to your plant tops without burning them in order to keep the plants from stretching and ensure optimal lumens at the canopy level. If you maintain all of these factors, you'll see strong, thick growth capable of supporting heavy colas.

SUBJECT: **Texas Tip**

FROM: **Bud Angel**

🌱 This year we were all hoping for a green grow season in Texas, but instead of light rains followed by sunny days, we received 100°F weather for more than three months. It was horrible! Much of Texas is currently on fire, and it's been very hard to keep your lawn alive, let alone your buds. During all of this, I was also trying to keep my crops from being seen from the air, when I came upon a technique that completely saved my season: sunscreens. Unlike a greenhouse, which has clear glass and color variations that can be spotted from the air, the shade cloth camouflages my grow nicely—I have at least three to four helicopters flying over it daily, and they're completely oblivious to the fact that it's there. The sunscreens have also helped retain the moisture needed for the plants to flourish and has kept the sun from smoking up my buds. In short, sunscreens saved the day, and there are many sick patients in Texas this year who will be grateful for what seems like a miracle.

Dear Bud,

Thanks for the tip! When growing in a greenhouse, it's always best to use an opaque glass that admits plenty of light without revealing the type of plants within. Also, I'm amazed that with all the heat and fires in Texas this summer, the authorities still have the time, money and manpower to search for people

growing cannabis plants. Congratulations on persevering over the heat (and "the heat"). Here's to many more successful grow seasons in the Lone Star State!

SUBJECT: **Help! It's Hot Where I Live!**

FROM: **Tbomun**

🌱 I live in a subtropical area where it's hot and humid seven to eight months a year. I have a small closet grow using a 3' x 3' x 6' Secret Jardin tent with an air-cooled 400-watt metal halide (MH) light and a big can fan inside to suck the air through the hood and out of the tent.

I typically grow one or two plants from November to February, because that's the only time it's cool enough outside that I don't have to run my AC. Once March hits, the central air has to be turned on because it's already 80°F overnight. If I run my setup and my central air, my electricity bill is crazy high—\$300 to \$400 a month—plus those one or two plants usually don't tide me over till my next harvest, so I end up having to find a source on the black market anyway.

I was wondering if you can recommend an alternative light that I can use during

the hot months to keep a grow going. I've read about LEDs, T5s and, now, induction lighting. Which would you recommend? I need to keep the heat and my electricity costs down. I'm also planning to try a Screen of Green method this time around to see if I can increase my yield. Thanks for all the great advice and knowledge you give in HIGH TIMES!

Dear Tbomun,

Thanks for the kind words! As for your predicament, I would recommend switching to either compact fluorescents (CFLs) or T5 fluorescent lighting during the hot months of the year. You can supplement with LEDs if you wish, but they're a bit pricey at the moment compared to fluoros and you mentioned keeping costs down.

Using the ScrOG (Screen of Green) method is a great way to increase yields without adding light or spending any more dough. Place a horizontal layer of chicken wire at canopy level and train the growing shoots to fill in the holes in this wire. Once you induce flowering, the buds will form and fill out at this level, thereby getting the most out of the amount of

This plant suffered from wilting due to intense heat coupled with Fusarium mold.







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*Danko Tip:* Flat white paint on growroom walls increases light efficiency and reflection.

light you're using by filling up all of the available space with plant material.

SUBJECT: **Cloning Auto-flowering Plants**  
FROM: **Randy**

Can an auto-flowering strain be cloned, or will that hurt the mother?

Dear Randy,  
You can induce roots to grow on an auto-flowering cutting, but the problem is that the plant will flower before it has a chance to develop a good root system. This leads to tiny plants that yield only a few grams of bud. You're better off planting auto-flowering seeds to grow bigger plants and then harvesting those at their full potential.

SUBJECT: **Moving Big Plants**  
FROM: **D.**

Please help with some advice or tips on how to move my plants, since a state trooper has recently moved into our building. The plants are both 5 feet tall, and I would really hate to lose them after they've gotten so big (plus the smell is to die for). Any advice would sure be appreciated! Thanks for your time.

Dear D.,  
Wow, you certainly are in a pickle—but with some careful planning, you should be able to move your plants and keep them growing until they're done. First, find a suitable location free of state troopers for your two beauties. Second,



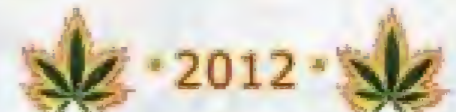
An unattended auto-flowering seed grew into this "popsicle stick" bud.





# Mandala Seeds

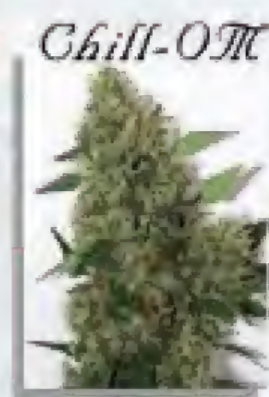
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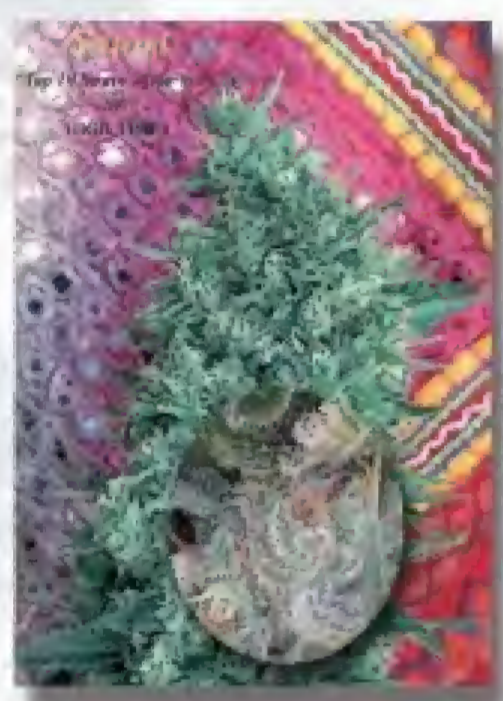
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SUBJECT: **GI Grow**

FROM: **AMS**

I'm a retired veteran and now have the use of my post-9/11 GI Bill benefits. I think that success in life is a relative term; for me, it would mean taking the available resources at this juncture of my life and trying to create a future doing something I like (and hopefully doing it well) while having a positive impact on my community.

In short, I want to grow pot. What would be the best type of degree or program for a guy with a free education in hand? Horticulture? Agriculture? Something else?

Dear AMS,  
Congratulations on the completion of your military career, and thank you for your service. Your best bet is to focus your education on horticulture. Classes in plant science, propagation, pest control and garden management will all help you achieve your goal of growing pot, but be sure to also study some cannabis-specific material such as HIGH TIMES magazine and our grow books and DVDs (my colleague Nico Escondido's *Grow Like a Pro* comes to mind).

Absorb everything you can about cultivating this wonderful plant, but beware of believing everything you read on the Internet. There is plenty of misinformation and bad advice floating around in cyberspace, so stick with trusted sources and reliable data. Your military background should also help you in planning, execution and discipline—three things that many growers only learn the hard way after several failed harvests. ✨





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# Busting Myths

## Bad research and staying trim on pot.

Got a question for Dr. Mitch? Email him at [420research@gmail.com](mailto:420research@gmail.com).

Dr. Mitch,  
There seems to be more research about marijuana's bad effects than its good ones. Is that true?

—Jacques P.

Hi Jacques,  
Yes, and it isn't confined to marijuana. Research—especially funded research—generally has a negative focus: There are about 25 times as many studies of depression as there are of happiness, and about twice as many studies on aggression as love. Thankfully, we have the choice to

thing that makes you skinny, but people who like the plant also seem to like staying thin.

Dr. Mitch,  
Is there a drug test that can tell whether you've smoked synthetic herb?

—KK

Hi KK,  
One drug test exists that can detect metabolites for at least one of the synthetic cannabinoids (JWH-018), but it's rarely used. On the other hand, now that JWH-018 is illegal, we might see

There are about 25 times as many studies of depression as there are of happiness, and about twice as many studies on aggression as love.

focus on the positive in our daily lives. Let the scientists bum themselves out if they want to.

Dr. Mitch,  
Is it true that cannabis devotees are skinnier than those who don't partake?

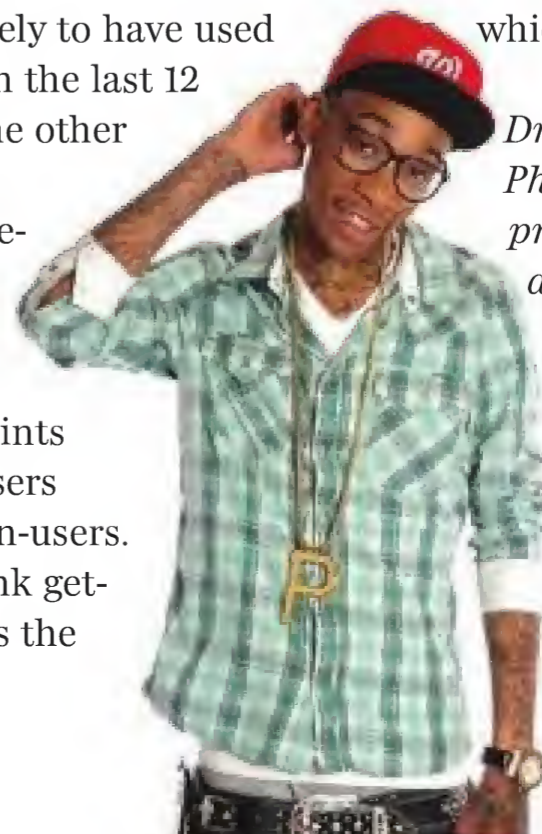
—Drew A.

Hi Drew,  
I know it's counter to the whole "munchies" stereotype, but two different studies do support this idea. One showed that obese people are less likely to have used cannabis in the last 12 months; the other found that rates of obesity were about seven percentage points lower in users than in non-users. I don't think getting high is the

an increase in testing for it. But we know very little about these substances: They were designed for animal experiments, not for human consumption. Case studies have blamed them for causing panic and even psychosis, and the guy who first synthesized them has said that anyone who uses them recreationally is an idiot. Given the choice between a natural plant with a 5,000-year history of safety and a chemical that was fashioned for use with rodents, which would you pick?

Dr. Mitch Earleywine, Ph.D., is an associate professor of psychology at SUNY Albany. He is the author of *Understanding Marijuana* and *The Parents' Guide to Marijuana*.

Wiz Khalifa's trim frame may be due to toking.







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## Thoughts on Occupy Wall Street

As they camp out in our nation's financial ground zero, are the protesters thinking about the Federal Reserve?

IT'S BEEN 43 years since a mass movement galvanized America's youth. In 1968, the primary issue was the Vietnam War, and the most important leaders emerged from the student-run SDS (Students for a Democratic Society). Richard Nixon was elected that year based on his promise to "end the war with honor," but that promise quickly proved empty as the war dragged on after his election with no end in sight. And when Nixon actually escalated the war with his invasion of Cambodia, thousands of students around the country took to the streets, and many of their demonstrations turned violent.

When the Canadian anti-corporate magazine *Adbusters* announced its "Occupy Wall Street" campaign in the spring of 2011, no one in the mainstream media paid attention. And when hundreds of activists started camping out in New York City's Zuccotti Park on September 17, no national news outlet covered their arrival. But dissatisfaction in America is so great that the numbers of protesters kept growing, and eventually the media was forced to take notice. And once the media arrived, a whole lot more people suddenly jumped onto the Occupy Wall Street bandwagon.

Initially, most of the media tried to ridicule the protesters for looking unkempt and not having a list of demands or a clearly articulated primary issue, even as the New York Police Department grew increasingly heavy-handed in its attempts to corral the demonstrators. But activism is more organized than it was 43 years ago—protesters remained nonviolent, even when confronted with police violence.

One of the first news reports I saw included an interview with a twenty-something male who, when asked what his biggest issue was, replied simply: "Abolish the Federal Reserve." This was music to my ears, considering that the Federal Reserve is nothing more than a privately held banking cartel with a monopoly on issuing money. If we ever did abolish the Federal Reserve, we'd



If we ever did abolish the Federal Reserve, we'd also abolish much of the national debt.

also abolish much of the national debt, as it collects interest on all the money released into the financial system.

When Barack Obama was elected, it was with the hope that he would bring real change to Washington. But that didn't happen; instead, Obama just placed more banks' executives like Goldman Sachs—the very people who'd created the financial disaster in the first place—into positions of political power. Instead of helping Americans, Obama has been helping the big banks with every step of his administration. If Obama really wanted to help America, he'd create a huge public-works project and hire millions of people. And he would pay those workers with greenback dollars not tied to Federal Reserve debt.

I'm glad Occupy Wall Street isn't a one-issue movement, because that makes it that much harder to co-opt. But if we have to settle for just one issue, let's take on the Federal Reserve. This movement is a wake-up call for a new generation, and it might be the first one since the 1960s motivated enough to make a real difference in our corrupt political system. ✨



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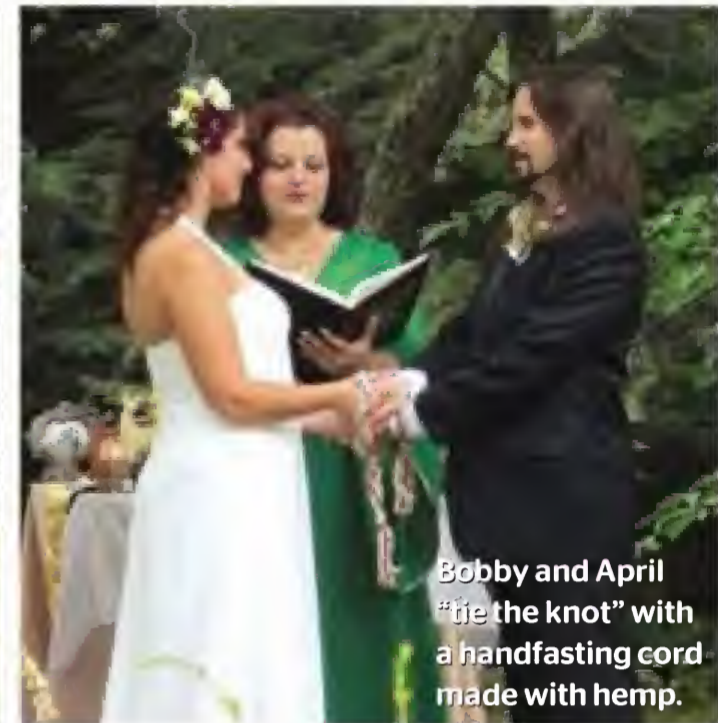


## A Stony-Book Wedding

A reefer romance that began at the 19th Cannabis Cup in Amsterdam culminated last August with a wonderful, weed-filled wedding weekend in the woods.



The wedding party: Morgan, Annette, Sarah, Melissa, Elisa, Tian, maid of honor Jenny, the bride and groom, best man John, Danny, Amon, Craig, Chris, Rick and Nico.



Bobby and April "tie the knot" with a handfasting cord made with hemp.

**N**EVER DID I imagine when first I laid eyes on the curvy, curly-haired cutie across that proverbial crowded, smoke-filled room in Amsterdam that she would turn out to be the love of my life. Now, nearly five years and seven Cannabis Cups later, that stony sweetheart of mine April was about to become my wife.

Since marijuana was such a big part of our love story and our lives, it felt only natural to infuse it into our nuptials: we used hemp paper for our RSVP cards, program covers, and table centerpieces at the reception—for which we found a special paper embedded with actual pot leaves. Even the handfasting cord we had custom-made (by Gaia's Handfasting) had hemp entwined into it. Plus, each guest's gift bag included a hemp wick, rolling papers, a medible, and a limited-edition stash jar with our peacock wedding logo on it—a gift from 420 Science.

Many of our other friends contributed to the occasion as well: artists Dr. Bobalicious and Glass Mantis blew us toasting goblets; our neighbor Dave played viola; HT's Rick Cusick performed a rendition of Bob Dylan's "Forever Young" during the ceremony; and former "Pot Star" Chris Eudaley and his wife Sonya supplied all the flowers. Cusick and Eudaley were also members of the wedding party—as were other HT colleagues Danny Danko, Nico Escondido, Craig Coffey, and former Miss HIGH TIMES girls Sarah and Tian (who also drew our peacock logo).



Pot leaf paper adorned the table centerpieces at the reception dinner.

Marijuana is such a huge part of our love story and our lives.

The wedding was held the weekend of the August full moon at Full Moon Resort in New York's beautiful Catskill Mountains. The party kicked off on Friday night with a creekside barbecue and campfire jam, where we enjoyed lots of songs, s'mores, and shooting stars (it was the peak of the annual Perseid meteor shower) as we got blazed beside the bonfire. Even our parents did dabs!

I spent the next day in a frantic frenzy of excitement—rehearsing, running around, setting up and melting down up until the very last minute. Then at 4:20, while most of the guests began gathering for the ceremony, I summoned the groomsmen and fathers to my cabin for a bro-down, where I presented them with their gifts (monogrammed cigarette cases) and enjoyed a few final puffs before heading down to the Lower Grove for the main event.

The handfasting ritual was conducted by my dearest friends—Wiccan high priestess Lady Amunet and high priest Lord Julian. I wrote the vows myself, as well as a sonnet entitled "Flower, Flesh and Flame" which I recited aloud to my beautiful bride. After tying the knot (quite literally) and being declared husband and wife, April and I danced back up the aisle to the Motown classic "(Your Love Keeps Lifting Me) Higher and Higher" by Jackie Wilson.

After dinner, dancing and dessert, we all lit candles and walked down to the lake for a moment of reflection beneath the glorious full moon. We did this in honor of Nemoralia, the ancient Roman festival devoted to Diana—the Goddess of the moon and the woodlands. Our festival of flame climaxed with a spectacular fire dance by our friend Jen Steele.

Finally, it was over to the roadhouse, where we partied late into the night with a musical mix of rock, reggae, and soul, live comedy from Rob Cantrell and Ben Vitoff, and a video performance of a song written especially for us by our pal Jet Baker. Oh, and there was also the psychedelic mushroom tea, but we won't get into that here....

It was an amazing weekend full of magic, music, marijuana and matrimony that none of us will ever forget. April and I couldn't be more grateful to our families, friends and fans for all of the warm wishes and gifts, and for helping make this the hempiest ... um, I mean *happiest* ... day of our lives. ✨



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# A Wrong Finally Made Right

NYC's pot-arrest policy may now  
be coming to an end.

Allen is executive director of NORML. Visit [norml.org](http://norml.org)

**S**HORTLY AFTER Michael Bloomberg took office as mayor of New York City, the NORML Foundation launched a half-million-dollar ad blitz. The purpose: to expose the fact that, under former mayor Rudolph Giuliani, the annual arrest rates for pot possession in the city had soared from around 2,000 to 50,000—a whopping 2,400 percent increase!

The hook: As a candidate, the mega-rich Bloomberg had acknowledged to the press that he'd used cannabis in the past. Indeed, he provided a remarkably candid reply when asked by reporters whether he'd ever smoked pot: "You bet I did, and I enjoyed it!"

NORML's ad campaign made national news and was terrific comedic fodder for late-night talk-show hosts. But Bloomberg didn't cease his predecessor's aggressive prosecution of petty cannabis offenses. In fact, a new and even more disturbing trend emerged: a nearly 9-to-1 ratio of minorities versus whites being arrested under his administration.

From 2005 to the present, Queens College sociology professor Harry Levine published numerous reports on the extremely high number of arrests and the racial disparity among those being targeted by police (see HT Dec. '11). Mainstream news articles, columns and editorials (including in *The New York Times*) called for an end to the city's

obviously biased cannabis enforcement policies. Yet Bloomberg simply continued to ignore the evidence.

But events last summer proved heartening. First, Bloomberg announced that he was partnering with fellow NYC-based billionaire philanthropist George Soros, a major funder of pro-cannabis reform organizations and voter initiatives. They announced plans to make significant donations to local social-service agencies helping young minorities with vocational education and employment opportunities.

And, as a result of the mounting pressure, NYPD chief Raymond Kelly has announced that a new enforcement

Mainstream news articles, columns and editorials called for an end to the city's obviously biased cannabis enforcement policies.

policy would be implemented in which police would no longer be allowed to routinely trick people into displaying cannabis in order to arrest them.

NORML, Professor Levine and the media will of course be keeping a close eye on the arrest data to see that this travesty of justice finally ends.

*For current pot arrest data in New York City and nationwide, visit [marijuana-arrests.com](http://marijuana-arrests.com).*

### FREEDOM FIGHTER

by Erik Altieri, NORML outreach coordinator

## The Ents Go To War

Legalization goes viral at the Reddit community Trees.

While the topic of cannabis is no stranger to the social network Reddit, one group in particular has managed to create an active community around marijuana culture and politics. Founded in November 2009, Trees ([www.reddit.com/r/trees](http://www.reddit.com/r/trees)) is a cannabis community

with more than 118,000 members, who refer to themselves as "Ents" (for the peaceful tree people in Tolkein's *Lord of the Rings*). The Ents have built a tight-knit group where anything marijuana-related is fair game.

Shaun Apple, the founder and director of Trees, says the group is "based around the idea that all should feel welcome, and also as a response to online tyranny. I created Trees as a safe harbor." Or as "Saplings," the Trees FAQ, advises new visitors to

the community: "Sometimes, Trees gets a bit serious. We care about getting weed legalized for everyone, and important news regarding that common goal [is] discussed by the Ents here ...."

But the Ents don't confine their energy to online discussion. This past September, Trees rallied behind NORML's White House petition for marijuana legalization and helped gather over 50,000 signatures in mere weeks. The group demonstrates that marijuana consumers can unite for a common cause and achieve real results.





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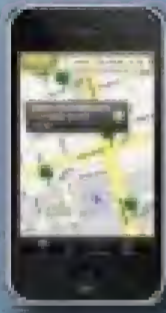
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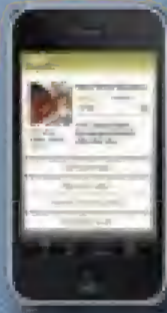
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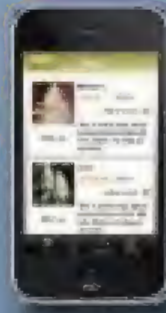
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It's a strain that a friend made by crossing Chem D with a Sour D x Afgoo.

**Get Sticky**

 This image is from Sticky Farms Gardens in Sacramento, CA. It's a strain that a friend made by crossing Chem D with a Sour D x Afgoo. We haven't come up with a name for it yet, but the Sour D x Afgoo we named Crystal Trident, so I guess it's Chem D x Crystal Trident. We're a medical grow co-op here in Northern Cali with two sites running 24,000 watts. —Lenny P. (Lpski420)



**Skunked Out**

 Check out my Skunk #1! It was crossed this season for the first time since 1977 with an African Kampala from a 1990 safari! I grew her in the shadows of the Three Saints (San Jacinto, San Bernardino and San Antonio) in SoCal. I hope Rhode Island gets their act together so I can move back east with some rare genetics. This one was tested by Werc at 10.08% THC, 0.23% CBD. —Tahquitz Peak Lookout





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**CAT OF THE MONTH**

**Cat Man Do**

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**STONER OF THE MONTH**

**Gnome Unknown**

A little Vermont green. This is why it's called the Green Mountain State! OG Kush, weighing in at 22 ounces dried. Awesome weed! —Heather



**Bowl Over**

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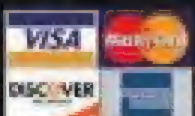
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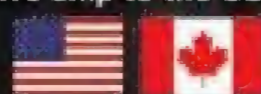
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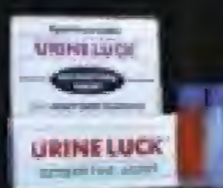
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# HIGH TIMES



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Senior cultivation editor Danny Danko delivers the goods on indoor marijuana farming, from the latest high-yield-inducing products to essential techniques for a successful harvest.

### ▶ The Art of Trellising

Cultivation correspondent Felix Green unveils the power of trellising for efficient canopies and bigger yields per watt.

### ▶ Homegrown Genetics

Legendary HIGH TIMES contributor Mel Frank illuminates the basics of cannabis genetics and breeding your very own strains at home.

### ▶ Growing Big Outdoors

Cultivation editor Nico Escondido visits one of Cali's premier outdoor farms and discovers how 15-foot plants yield up to 10 pounds each!

### ▶ 2010 vs. 2011

Paul Armentano, deputy director of NORML, examines the anti-pot smackdown being waged by the Feds.

### ▶ Michigan Magic

At our recent HIGH TIMES Medical Cannabis Cup in Detroit, the greatest ganja of the Great Lakes State was celebrated.

### ▶ Jeremy Piven Interview

The actor behind Entourage's Ari Gold talks about smoking with Snoop Dogg and his new role in a drug-fueled buddy movie.

### ▶ The End?

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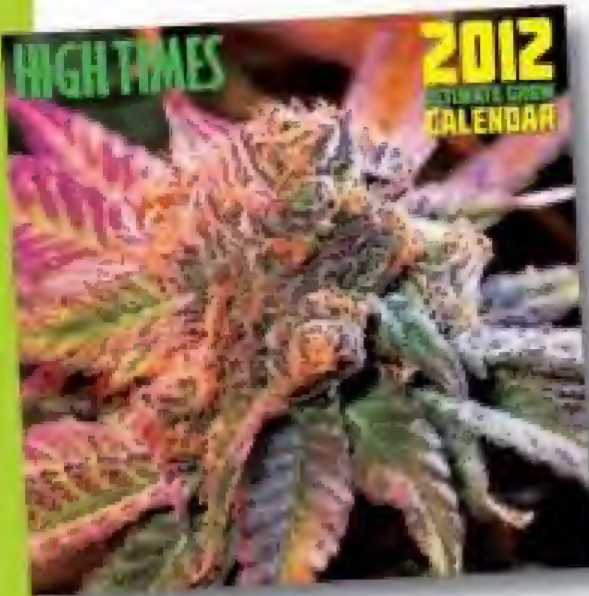
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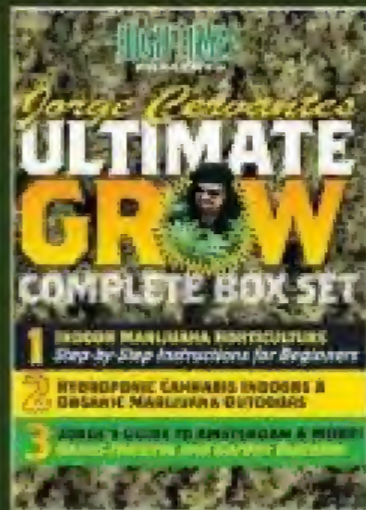


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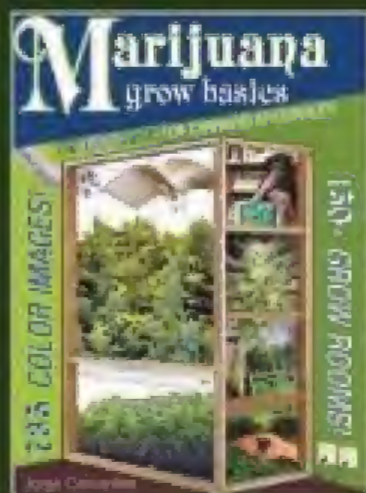
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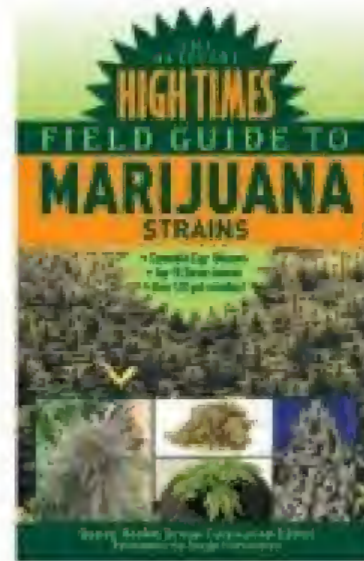


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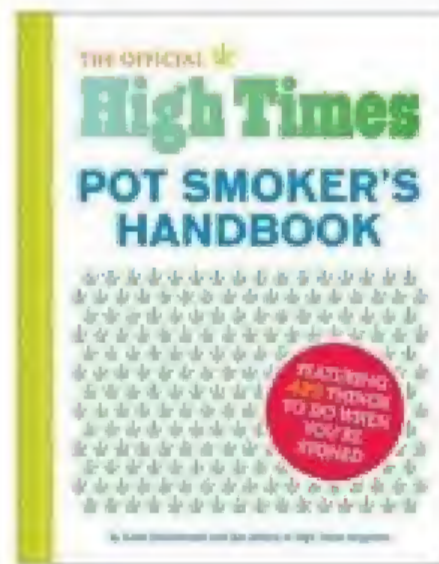
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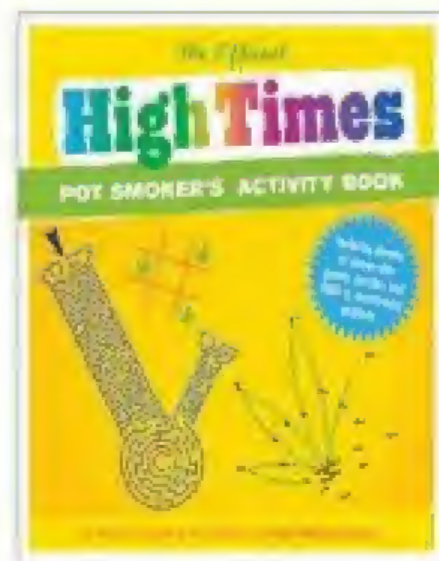
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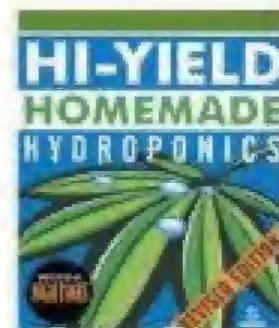
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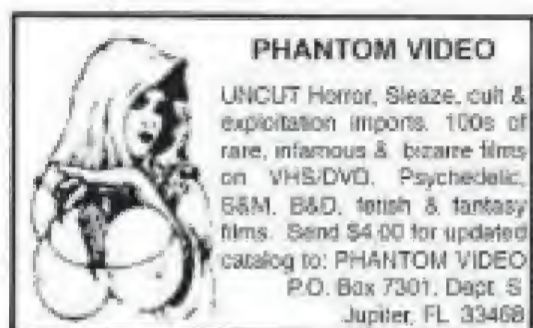
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(2) 1.5 hrs North LA, (1) 42 acres No. CA. Details: [nicksal215@gmail.com](mailto:nicksal215@gmail.com). Can finance. (661) 765-2603.

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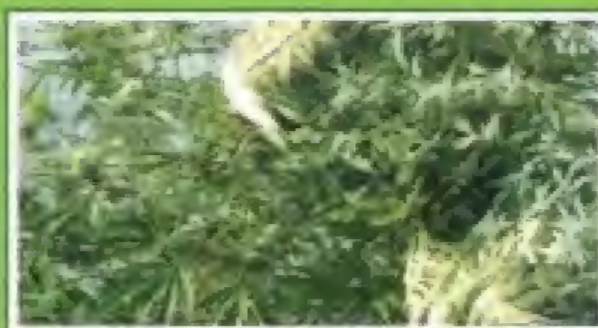
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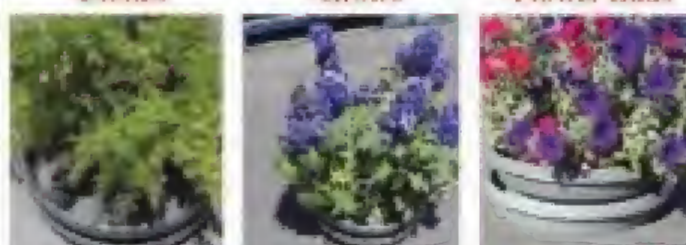
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2 **Grandpoobah**  
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11 **TOKE**  
If you wanna FUCK PAIN PILLS GIVE ME WEED!!

12 **you betta fuckin' VOTE!**

13 **WHEN WILL IT END??**  
THE PROHIBITION OF POT... There's nothing booze can mend, that smokin' bud cannot!

14 **FRIENDS DON'T LET FRIENDS GO WITH OUT!**  
BE KIND PASS IT ON! *Approved by weed school!*

15 **LOCAL WEED for TRUE FRIENDS**  
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16 **The SOCKS who FOUGHT**  
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17 **Bamboo County well**

18 **RIP forever TOM & ROLLIE**  
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19 **MALCOLM X**

20 **SHUT DOWN INDIAN POINT NUCLEAR PLANT**  
DOWNWIND 30 miles from NYC. If it goes we all go. *Where?*

21 **Concentration on rotation leads to marvelous inhalation**

22 **JAGGER**  
Junction Against Government Gauging Enviably Recreation - Johnny Jagger

23 **Sensi seeds**  
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Place the tip of your fingernail against the reflective surface and if there is a GAP between your fingernail and the image of the nail, then it is a GENUINE mirror. If your fingernail DIRECTLY TOUCHES the image of your nail, then BEWARE! IT IS A 2-WAY MIRROR!

25 **J & B Blended Whiskey**  
See Don't Gulp!

26 **Getting Stoned and watching Classic Cartoons**

27 **JUST A NORMAL Oregonian**

28 **FUCK! SPIDER MITE'S**

29 **"Praise the Lord, Pass the Weed"**  
(Bonus track from the Rubber Knife Gang's recent album "Drivin' On")

30 **GODS GREEN GRASS HEALED MY CROHNS DISEASE**

31 **...and the cheesy movies she hosts... Some of them are pretty funny**

32 **Chillin'**

33 **Smoke**

34 **Politicians and Diapers need to be changed for the same reason**

35 **FREE Marc Emery...**  
We miss you, bro! - Mace

36 **By and large, language is a tool for concealing the truth.**  
- George Carlin

37 **"PRAYER: THE LAST REFUGE OF A SCOUNDREL."**  
- Lisa Simpson

38 **FOOD and WEED is all we need.**  
Oh, sex, too! ... Right after we smoke!!

39 **LIVE LIKE YOU'RE DYING!**  
one day at a time!

40 **Hemp is of the first necessity to the wealth and protection of the country.**  
- Thomas Jefferson

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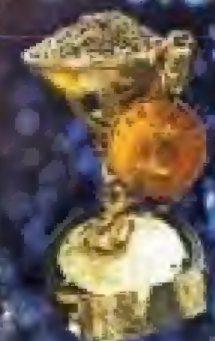
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